

The Mining Journal

Established 1835

Railway & Commercial Gazette

Vol. CCXXXVII No. 6064

LONDON, NOVEMBER 9, 1951

PRICE 9d

RAPIER

Builders of Europe's

LARGEST EXCAVATORS



ALL SIZES FROM $\frac{1}{2}$ TO 11 CU. YD.

WALKING DRAGLINES

RANSOMES & RAPIER, LTD.
IPSWICH ENGLAND

T. BOYD BOYD & CO. LTD.

Passages by Sea & Air

11, Sise Lane, Queen Victoria St.,
London, E.C.4

Telephone:
CITY 4433

Telegrams:
BOYELBA

also LIVERPOOL - GLASGOW - MANCHESTER - HULL

KNAPP & BATES LTD.

Flotation & Ore Dressing
Equipment

10, GATE ST., KINGSWAY,
LONDON, W.C.1

Cables: Flowsheet Holborn, London Telephone: Chancery 6770



**FOR ALL
MINING
CABLES
AND
ACCESSORIES**

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

H
1801 1951
150 YEARS

FIRST IN SERVICE!

FIRST FOR PERFORMANCE

The Handril-Airleg-Holbit Combination



HOLBIT.
Tungsten
Carbide Bit.
Cross and
Chisel Types
in various
sizes from 1 1/2"
to 2" and in
two grades of
tungsten
carbide.



Since the now world-famous and widely used Holman Combination first saw active service it has been responsible for a revolution in drilling technique. It has made one steel per hole the standard of drilling practice everywhere. Capable of drilling deep parallel holes in any direction, it cuts labour costs and increases output phenomenally.

NEW DESIGN FEATURE—greatly improved control handle, which provides easier operation while retaining simple, robust construction.

MAKE SURE you receive prompt information about each new Holman development in this field. Are you on our mailing list?



BROS. LTD.
Holman
CAMBORNE, ENGLAND

PHONE : CAMBORNE 2275 (9 LINES)

SUBSIDIARY COMPANIES, BRANCHES AND AGENCIES THROUGHOUT THE WORLD

GRAMS : AIRDRILL, CAMBORNE
HB3

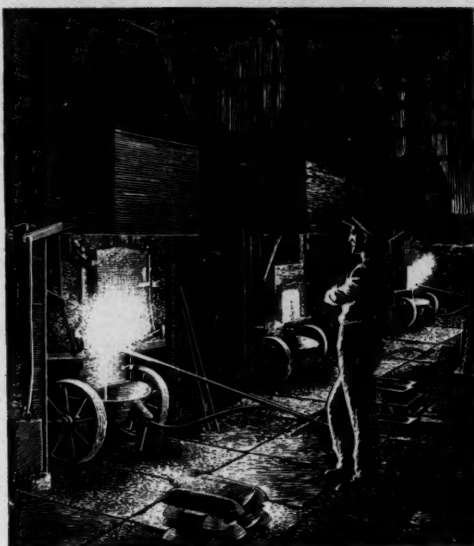
SILVER

SMELTING AND REFINING ...

The handling of silver-bearing materials of relatively low content is one of the specialist services of our refineries. Mining by-products, residues and electrolytic slimes are treated in large quantities in a plant which has an immediate capacity of 1,500,000 oz. weekly. Upon instruction, the refined contents may be marketed or returned in any form desired.

GOLD AND PLATINUM

Our refineries handle also bullion, ores, concentrates, slags, matter, and mining by-products containing gold and the platinum metals.



Cupellation, the first stage in silver refining

Johnson Matthey

MELTERS AND ASSAYERS TO THE BANK OF ENGLAND

JOHNSON, MATTHEY & CO., LIMITED
HATTON GARDEN, LONDON, E.C.1

Canada : Johnson, Matthey & Mallery Limited, 110 Industry Street, Toronto 15, Ontario
Australia : Garrett, Davidson & Matthey Pty., Ltd., 824 George Street, Sydney, New South Wales



48, BURLINGTON ROAD, ISLEWORTH, MIDDLESEX

TRACTORS

D.2 Caterpillar Tractors, Model 3.J.5, several machines in unused condition and reconditioned throughout before delivery.

AIR COMPRESSORS.

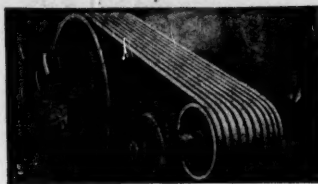
Several Diesel driven sets by Consolidated type PO.2/125 with Ruston 3 VRO engines. Air receiver, fuel tank. On two wheel pneumatic trailer or four solid tyres.

PNEUMATIC TOOLS.

Several C.P.4. High lift sump pumps with delivery hose. Unused. Several Rock drills by Climax, 52 lbs. with 4 1/2 x 11 in. chuck. Unused. All sizes reconditioned road breakers, rock drills, woodborers, etc. Air hoses 3/4 in. in lengths 50/60 ft. with or without couplings.

HAND DERRICK

Anderson-Grice All steel hand derrick Crane with 60 ft. lattice jib. To lift 3 tons a 45 ft. radius. New in 1946 and little used. Can be inspected erected, at our works.

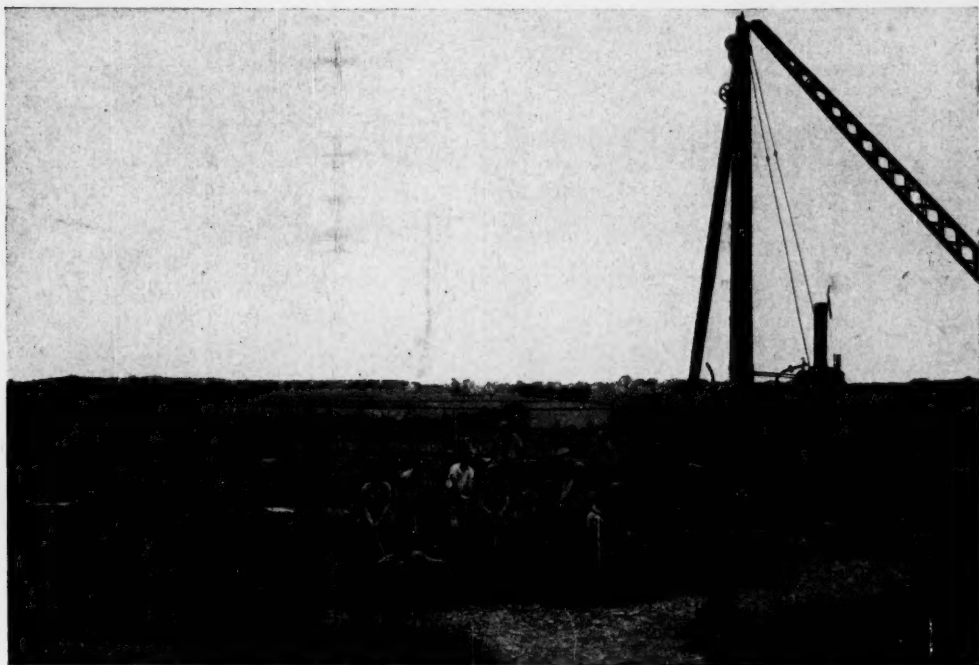


For all types of
Mining Machinery
specify:—

WIGGLESWORTH
short centre V rope drives
"TEXROPES"

FRANK
WIGGLESWORTH
& CO. LTD
ENGINEERS
SHIPLEY YORKS

'Phone: SHIPLEY 53141 Grams: CLUTCH, SHIPLEY



MINING FACTS. No. 2.

Pasture, woodland and cornfields form a background to our photograph showing the very commencement of a colliery designed eventually to produce 2,000,000 tons of coal per year.

Two shafts each 24 ft. 0 in. diameter will be sunk to a depth of 3,000 ft. or thereabouts and will pass through heavily watered horizons, flint-like rocks and heavy, treacherous strata on their way to the coal.

Throughout their length the shafts

will be lined with reinforced concrete designed to withstand water pressures of 500 lb. per sq. in. and more and to hold safely and for all time true to line and shape against tremendous earth pressures and possible movements.

Such an undertaking requires a full equipment of plant and an intimate knowledge and resourcefulness. The Cementation process will be used and there is no possibility of failure or untoward delay.

THE CEMENTATION COMPANY LIMITED
BENTLEY WORKS · DON. 54177-8-9 · DONCASTER



Bring your detective powers to bear on the search for scrap and you'll probably unearth tons of it disguised as old plant you never use or hidden in out of the way corners of your warehouses, stockrooms and yards.

The new steel every industry needs can be made from the old steel it has done with. Find all you can. Round it up. Turn it in.

Your scrap merchant will help with dismantling and collection.

WANTED
from the
MINING
INDUSTRY

Old cranes and machinery, wire ropes and every kind of general and process scrap and obsolete plant.

SPEED THE SCRAP
SPEED THE STEEL

Issued for the **STEEL SCRAP DRIVE** by the
British Iron and Steel Federation

STEEL HOUSE, TOTHILL STREET, LONDON, S.W.1



IT BEGAN WITH THE CRUSADES

We take some pride in our long history but the business in which we are engaged is older than we are.

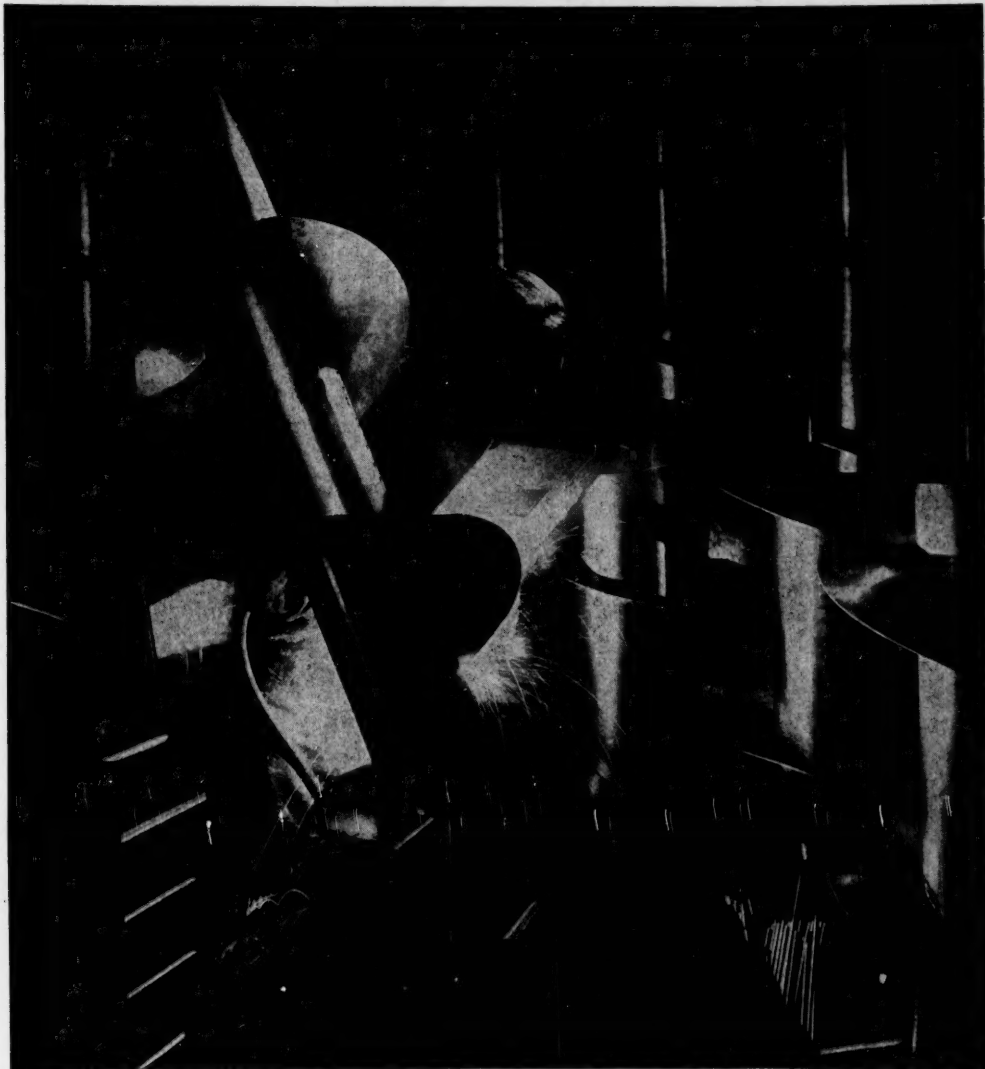
Eastern banking began in the 12th century when the Knights Templar, protecting the lines of communication which sustained the Crusades, devised a mechanism for exchanging currencies and transferring goods between Western Europe and the Asian Continent. This primitive but highly efficient banking service made possible a rapid expansion of the trade between the Eastern and Western worlds—a traffic which has been fittingly described as the foundation of all commerce. Nowadays travellers along the Asian trade routes and merchants and manufacturers engaged in the Eastern trade entrust their banking transactions to The Chartered Bank of India, Australia and China which maintains an extensive system of branches, under British management directed from London, throughout Southern and South-Eastern Asia and the Far East.

**THE CHARTERED BANK OF INDIA,
AUSTRALIA AND CHINA**

(Incorporated by Royal Charter, 1853)

Head Office : 38 Bishopsgate, London, E.C.2
West End (London) Branch : 28 Charles II Street, London, S.W.1
Manchester Branch : 52 Mosley Street, Manchester, 2
Liverpool Branch : 27 Derby House, Liverpool, 2
New York Agency : 65 Broadway, New York, 6

Branches of the Bank are established at most centres of commercial importance throughout Southern and South-Eastern Asia and the Far East.



Welding of 'elevators' for harvesting machinery by Messrs. Fisher and Ludlow Ltd., Erdington

Electric Welding

WELDING is one of electricity's most revolutionary processes. Compared with riveting, it shows a man-power saving which is almost incredible. You can build your structure from a plate or sections instead of casting it or machining it from the solid. *Electric welding saves time, power and greatly increases output.*

WHERE TO GET MORE INFORMATION

Your Electricity Board will be glad to help you to get the utmost value from the available power supply. They can advise you on ways to increase production by using Electricity to greater advantage — on methods which may save time and money, materials and coal, and help to reduce load shedding. Ask your Electricity Board for advice: it is at your disposal at any time.

Electricity for PRODUCTIVITY

Issued by the British Electrical Development Association.



NOBEL GLASGOW EXPLOSIVES FOR COALMINING

*The assistance of our
Technical Service Department is
readily available in connection with any problem
in Blasting, Ripping, or Drifting
in coalmines.*

Enquiries and orders should be addressed to the nearest I.C.I. Sales Office or to:—

IMPERIAL CHEMICAL INDUSTRIES LIMITED

Nobel Division, 25 Bothwell Street, Glasgow, C.2



The Mining Journal

Established 1835

Vol. CCXXXVII No. 6064

LONDON, NOVEMBER 9, 1951

Price 8d.

CONTENTS

Notes and Comments	461
From our Australian Correspondent	463
Diamond Orientation in Diamond Bits	464
Reviews	467
Giant Excavator for Iron Ore Mining	468
Technical Briefs	470
The Use of Xanthates in Head-Mine Flotations; New Steel-Making Process; Power from Lignite	
Machinery and Equipment	471
Recovering Gold with the Howard Rotavator; B.T.R. Long-Life and Pitmaster Conveyor Belts; Fluorescent Lighting Adds to Pit Head Amenities.	

Metals, Minerals and Alloys	472
Mining Men and Matters	474
The Mining Markets	475
Company News and Views	476
Free Gold Sales in Canada and Western Africa; Self Help for Nanwa.	
Company Shorts	476
Topical News in Brief	478
Company Meetings and Announcements	479
Siamese Tin Syndicate; Bangrin Tin Dredging; Harmony Gold Mining; Rhodesian Anglo American	
September Tin Quarterly Outputs	481

Published by The Mining Journal Ltd. at 15, George Street, London E.C.4.

Subscription £2 per annum (post free)

NOTES AND COMMENTS

The Grim Reality

Faithful to his promise the Prime Minister on Tuesday revealed to the country the naked truth of the unbalanced situation in our external trade position. It has been realized that the situation was disquieting though the late Government had given no figures which could be regarded as a National Balance Sheet. The Prime Minister described the present overseas deficit as worse than in 1949 and in many respects worse even than 1947. The adverse balance in the current half year is running at the rate of £700,000,000 and the whole year may amount to between £450m. and £500m. Without a radical change in the policy next year's deficit may be even larger.

The fall in gold and dollar reserves for the third quarter of the year was \$638m. and the deficit for the sterling areas as a whole next year seems likely to be appreciably greater than the deficit in the value of payments. As these figures appear to have been taken from the Treasury paper prepared by the orders of the late Government the general position must have been known to the Cabinet before the late Election, and suggests one reason why Mr. Attlee dissolved Parliament when his parliamentary majority was no more tenuous than it had been for months. It was clear that a drastic change in our economic policy was necessary and, obviously, Mr. Attlee could not hope to effect this in the face of the strong opposition led by Mr. Bevan.

A trading deficit of £700m. in the current half year furnishes the stark answer to Mr. Attlee's bold assertion before Congress at the beginning of his ministry that "we shall not allow ourselves to be beaten by economics." Unfortunately it is the nation rather than any political party that has to bear the consequences of the defeat. Financial issues to-day are so complex that the ordinary citizen soon finds himself out of his depth, and we have yet to see how far these disastrous disclosures will shock public opinion into the acceptance of the inevitable sacrifices which must be made if the nation is not to drift into bankruptcy. The old problem is still unanswered—*we won the War; can we win the Peace?*

On Wednesday the new Chancellor of the Exchequer, Mr. R. A. Butler, outlined the steps which the Govern-

ment has decided to take to meet the critical situation which has developed—much of the inflationary position in the country can only be met in the next Budget. Meanwhile the effects of pruning of expenditure in the departments of State can only be judged as the new estimates are framed. To save £350m. on external payments is the problem. To do this unrationed food will be heavily cut and to a less extent rationed food. Stockpiling will be slowed down and the Bank Rate raised from 2 per cent to 2½ per cent. An Excess Profits Tax which figured in the Government's pre-Election platform will be imposed from January 1, where the abnormal process of rearmament has created a fortuitous rise in profits, and the Chancellor appealed to companies generally to adopt a very cautious policy on dividend distribution. These are a few of the main points in Mr. Butler's proposals. The central objective is to keep sterling strong and if the steps already decided upon prove inadequate the Government will not hesitate to take further action to attain that end.

Cyprus Mining Developments

The Government of Cyprus is at present considering a mining law revision and detailed proposals have been circulated privately to the mining companies, which have been asked to submit their comments before the new law is published. It is stated in industrial circles that the Government's aim is, in the main, to exercise a larger measure of control over mining operations, though some doubts have been expressed whether the new legislation may not signify a first step on the road towards nationalization of the industry which is at present run entirely by private interests.

Cyprus has benefited greatly from the current world metal boom. The island has the largest iron and copper pyrite deposits in the British Empire and a comprehensive geological survey just launched may reveal further deposits: special attention is to be given to lesser-known mineral areas.

Mining is, of course, Cyprus's chief industrial activity and mine products form by far the largest export group. Since 1946, when full-scale production was resumed after the war, Cyprus has exported well over 3,000,000 tons of

minerals valued at £17,000,000, including cupreous concentrates, copper and iron pyrites, chromite, asbestos, gypsum and terra umbra. A large part of the earnings are in dollars and other hard currencies, since the United States, Belgium, Germany, France, Holland, Egypt, Greece and Czechoslovakia are the main markets. However, Britain took less than 1 per cent of the total quantity exported from 1946 to the end of 1950.

Current exports from the island are rising rapidly. The value in September was an easy record at £1,175,163 and the tonnage of the respective minerals as follows: cupreous concentrates, 15,835 tons (£709,564); cupreous pyrites, 9,950 tons (£63,550); cement copper, 330 tons (£34,350); iron pyrites, 73,809 tons (£218,788), asbestos, 2,596 tons (£121,832); chromite, 1,000 tons (£12,500); gypsum, 16,827 tons (£13,110); umber, 173 tons (£1,217); ochre, 33 tons (£252).

Chrome Ore Deposits in Southern Rhodesia

Southern Rhodesia's reserves of chrome ore are sufficient to supply total world demand for several hundred years. Dr. F. L. Amm, a member of the Colony's Geological Survey, stated at a recent meeting of the National Affairs Association. The present rate of Southern Rhodesian production was 400,000 tons of chrome ore annually, equal to a market value, at the current price of £13 a ton, of over £5,000,000 a year. However, more than half this sum was accounted for by freight charges.

If the output were converted into ferro-chrome on the spot, instead of being exported in ore form, as at present, it could bring in from £20,000,000 to £30,000,000 a year and would thus be by far the most important industry in the Colony. But this could only be achieved with abundant supply of cheap electric power. Conversion of the 400,000 tons p.a. now being mined would require 1,280 million units of electricity annually. While this was five times the power generated by the Electricity Supply Commission last year, it did not represent more than 40 per cent of the output expected in the initial stage from the Kariba Gorge scheme. "The production of ferro-chrome is the only major project we have, based on our raw materials, which would absorb the power output from so vast a scheme."

However, Dr. Amm warned that serious competition might be met with from chromium extracted by a chemical method, which possessed the advantage of yielding, as the final product, metallic chromium, and not iron-chrome alloy, and he added that plans for the construction of a pilot plant using this chemical process were under consideration in the United States, preparatory to the large-scale introduction of the process.

British Columbia as Centre for Iron Ore

With the opening up of a second ore deposit on Texada Island, and the construction there of a deep sea dock by the Argonaut Co., Ltd., which has already spent more than \$3,000,000 opening up the Quinsam Lake deposit on Vancouver Island, the Province of British Columbia looks like becoming the major shipping centre for iron ore on the Pacific Coast. The company states that although the Texada development will be smaller than the one on Vancouver Island, it will include a magnetic separator, which will concentrate the ores before shipment, and have a wharf capable of accommodating any type of ship up to 20,000 tons. Quinsam ore is already being shipped to Japan and when Texada ore is ready, the combined shipments, at their peak, will employ eight vessels carrying 80,000 tons a month to Japan's steel furnaces. Mr. R. E. Powell, president, Aluminum Corporation of Canada, has been visiting the company's project in B.C. and surveying the now desolate area around Kitimat, he said: "By 1954 there will probably be 10,000 persons or more living there;

and Alcan's smelter will be turning out 100,000 tons a year."

Eight contracting firms in Vancouver have grouped themselves together as Kitimat Constructors Ltd., to build the first stages of the smelters and townsite for the Aluminum Co. of Canada. They have established a camp site at Kemano, 40 miles below Kitimat, where the power-houses will be built inside the mountain, and where the 10-mile tunnel through the Coast Range will have its outlet. Initial expenditure will be in the neighbourhood of \$175,000,000 and by next year, 1,000 men will be employed.

Coal Mining Mechanization in West Germany

West German coal mining experts hope that the mechanization of Ruhr coal mining, still in its early stage, will, according to a recent Reuter report from Düsseldorf, have made substantial progress by the end of next year, when about 100 Loebbe Hobel, the latest German fully automatic coal cutting machine, are expected to be in operation. This machine, a ramming block with six to ten conical tusks at its front, differs from other types of coal cutters chiefly in its working method. With a comparatively small cutting depth of 50 to 150 millimetres and a rather high speed of 0.38 metres per second, it travels along the coal face in both directions. The driver is supplied by the Westphalia Panzer Conveyor, with which it is combined. The coal stripped off is automatically loaded on to the conveyor, which hauls up to 250 tons an hour at a speed of 0.73 m/s.

Hobel and conveyors are produced by the Gewerkschaft Eisenhuette Westphalia at Lünen, in the Ruhr, at a rate of seven a month. The management has said that about 120 of these cutters have been ordered since flow production was begun about a month ago. About 20 would be exported, including two each to Holland, Belgium, Italy and Britain. Delivery periods are about 12 months owing to raw material difficulties. The price of a Hobel and conveyor is about 500,000 marks.

The production of coal cutting machines is virtually confined to three firms in West Germany: the Gewerkschaft Eisenhuette Westphalia at Lünen, J. Eickhoff at Bochum, and Soest Ferrostahl at Düsseldorf-Oberkassel. Apart from the Hobel and the Panzer conveyor, the principal machines produced are: the fully automatic Dauerwähler (continuous cutter), especially suitable for long walls and very hard coal, the semi-automatic cutter (Schäm-Maschine), both made by the Eickhoff firm; the semi-automatic frame cutting machine (Rahmen Schräm Maschine), and the semi-automatic scrapper (Schäl Scraper), both made by Soest Ferrostahl.

Exports of West German coal cutting machinery are said to be negligible owing to strong British and American competition.

There are three reasons why mechanization in the German coal mining industry is still behind that in other countries, especially Britain and the United States. Firstly, about half the German pits could not be mechanized further because of the irregular structure of the coal seams. Secondly, there was still a lack of investment capital (a new shaft is estimated to cost about 300,000,000 marks). Thirdly, the ownership of the mines was still not settled. The present owners were unwilling to invest large sums as long as the reorganization programme worked out by the mining management and the miners' trade union was not completed and owners could not be sure whether they would keep their pits entirely, partly, or in the most extreme case, not at all. So instead of laying out two or three new shafts a year—necessary to maintain an even rate of production—the industry had merely been rebuilding existing shafts. However, the ordering of about 100 new Hobel machines suggests that owners are now more optimistic about the reorganization programme.

Australia

(From Our Own Correspondent)

Melbourne, October 30

The sale of Australian gold on the free market, which has been urged for some time as a very important factor in the preservation of the gold mining industry, is at last to take shape as a result of a recent decision of the International Monetary Fund. It is generally considered that the quantity saleable on the open market will be 40 per cent, and in this regard, the Fijian gold mines have announced that the Government of Fiji will permit the sale of 40 per cent of the output until further notice.

So far, the Commonwealth Government has not given any lead in the matter and conversations are about to take place between the gold mining industry, as represented by the Chambers of Mines of Western Australia, Victoria and Queensland, in order to establish the conditions governing premium sales, the manner in which such sales are to be conducted, and the participation of the producing mines in the premium received. Until these matters have been decided, the general tone, while welcoming the prospect of an increased return on a substantial portion of the country's gold production, is rather cautious until it is known whether the Government will agree to the views of the industry, or whether some less favourable compromise must be accepted.

There is, of course, the big question as to how much gold can be absorbed by the open market, and whether a marked increase in supply will materially affect the price anticipated, unless there is a corresponding increase in demand. The matter of adjusting premium sales is somewhat complicated by a request already made to the Commonwealth Government for a subsidy on gold produced which, it appears, is inconsistent with the articles of agreement of the International Monetary Fund. There is some doubt as to whether the benefits to be gained from premium sales will be of sufficient value to some border-line mines, working low grade ore, to give a reasonable chance for continuation of operations, unless assisted by the subsidy that has been requested, and this aspect will be considered in the discussions about to take place at Canberra. Actually, the Commonwealth Government has made strong representations for a higher world price for gold and will continue to do so, according to a recent statement by the Federal Treasurer. Opinions held at the moment are that Australian gold producers may gain more than £A.600,000 per year by the sale of the proposed proportion of the gold production on the open market.

MINING INDUSTRY THREATENED BY INDUSTRIAL CLAIMS

The Australian Workers' Union, which is the largest and most important union in the metalliferous mining industry, has issued a log of claims for a new award which will affect the eastern Australian States.

One claim is for a weekly allowance similar to the Broken Hill lead bonus, which, both there and at Mount Isa, is proving a very heavy burden on the industry, with no corresponding gain in production—in fact, experience has proved the reverse. A 35-hour week is claimed for underground workers, with a general increase in marginal rates of up to 30s. a week; in addition, a break for tea of 15 minutes in the morning and afternoon, in the employers' time is demanded as well as three weeks' annual leave. A further claim is for two weeks' sick leave with the provision that any portion not used during the year is to accumulate.

The serious incidence of these demands, if granted, may be assessed from existing industrial conditions under the present award in Victoria. In that State, three weeks' annual leave is granted, but not in other States, 10 statutory

holidays are given and paid for, and a week's sick leave. Thus, the mining employee is paid for six unproductive weeks. With a number, there is no accumulation of sick leave, for a day is taken from this concession for the races or other purposes. Included in the log is a demand for long service leave, ranging from two months after five years' employment, to 24 months after 25 years' employment.

The log goes even further, and aims at actual job control, and seeks to place in the hands of union representatives the direction of mining operations, usurping the functions of mine managements, or Departments of Mines, through their Inspectors of Mines: as for instance, the manner in which work shall be carried out, the kind of timber to be used in underground workings and the method of placing it, which, with other matters, the log aims to place in the hands of union representatives.

The claims will be vigorously opposed, for no section of the industry, and particularly gold, is in a position to carry the burden of hours, rates, and the other onerous conditions proposed. On top of the log comes the quarterly increase of the basic wage for 10s. per week.

ALUMINIUM DEVELOPMENTS

The aluminium ingot industry is taking shape, and works are now in course of construction near Launceston, Tasmania, together with a hydro-electric power project to supply the works. The Commonwealth Government has ordered that production of aluminium in Tasmania should be achieved by late 1953. It is now evident that the estimated cost of establishing the industry at Bell Bay, on the Tamar River, will exceed the original figure of £A.3,000,000, which the governments of the Commonwealth and Tasmania agreed to provide jointly. It is expected that the Australian Aluminium Commission will make a request for more finance for the work to be carried out in the coming year, and until the whole construction programme has been completed. That estimates are being exceeded is only to be expected under present conditions, for it has been, and is, quite impossible to foresee the industrial trend, one factor alone being the increase in the basic wage by approximately 10s. per week per quarter.

COPPER SHORTAGE

The position of Australian industry in regard to supplies of copper is serious, especially in view of the decision of the International Materials Conference in Washington to cut this country's copper consumption by 20 per cent. At the present time, the big shortage of copper is being met by imports from Rhodesia. Requirements of industry are 35,000 tons per year, and Australian production is only about 14,000 tons per year. The immediate prospect is for an increase in consumption of 41,000 tons.

The only prospect of relief is the coming into production of the large copper lode at Mount Isa Mines, Queensland, where work has been proceeding, under heavy difficulties in materials supply, on the construction of the copper mill and smelter. It is anticipated that the new plant will be brought into production by the end of 1952, but by that time a further large increase in demand is anticipated, so that the gap between demand and supply will still be wide.

The country is not deficient in small occurrences of copper ore, many of which might be worked as groups, but the prevailing conditions of labour, shortage of supplies, high costs, and taxation, form an effective bar to the introduction of capital into the prospecting, opening up and equipment of any of these propositions. The time has come when some adequate and effective plan of encouragement must be given to the opening up of the smaller, and idle, base metal deposits, many of which could make a useful contribution to the increasing demand for such metals, but even so, the limiting factor is the labour supply, an inhibition that can be expected to continue, unless met by the importation of a new influx of mining labour.

Diamond Orientation in Diamond Bits

By ALBERT E. LONG, Chief, Diamond Bit Research and Diamond Drilling Consulting Service

As it is known that the various crystal surfaces of diamonds differ in hardness, the U.S. Bureau of Mines is conducting a series of experiments in which the effects of various orientations of drill borts, set in the crowns of diamond bits, are being investigated. U.S. Bureau of Mines Report of Investigations 4800 (extracts from which appear below), is the first of a series on these experiments. It describes in detail the procedures used as well as the results obtained in the preliminary experiments, conducted in the laboratories and full-scale mine of the Bureau's Mining Research Branch, Minerals Technology Division, Region VIII, Mount Weather Station, Bluemont, Va.

Through experience gleaned and observations made over generations, the cutters and polishers who produce gem diamonds have learned that diamonds do not have a uniform hardness over their entire surface. Also, they found that the ease with which they polish a given surface varied with the direction of lapping across that surface. They use this knowledge to speed the lapping of facets on gems by taking advantage of the softer directions and planes of the diamond being lapped.

The knowledge of the diamond polishers was correlated with modern crystallographic concepts by Kraus and Slawson (*American Mineralogist*, 24, 1939, 661-676). These authors were more concerned with the variation in hardness than in the lapping directions. Subsequent work by the same authors and others (see bibliography), delineated the areas of maximum hardness for different directions in a diamond and thus indicated within close limits those areas which would be most suitable as working surfaces in diamond tools.

In July, 1949, Dr. James Boyd, director of the U.S. Bureau of Mines, through personal contact with Edward H. Kraus, obtained both oral and published information on the variations in hardness of a diamond. This information aroused his interest and was made available to the author through L. B. Moon and Wing G. Agnew, with a suggestion that it be studied to determine whether the principle involved could be applied to the production of diamond bit crowns. The principal difficulty with the published information on diamond vectors available to the author was that the information was presented from the viewpoint of a diamond cutter, who is normally concerned with avoiding the hard planes and directions when lapping facets on a gem stone, whereas the reverse would be advantageous in setting the stones in the crown of a diamond bit.

Using Congo diamonds ranging in size from 8 to 12 carat as models, the author studied the problem and, by the autumn of 1949, became convinced that the key crystallographic characteristics of the Congo diamonds at his disposal were recognizable, and that these diamonds could be oriented in a bit mould in positions that would utilize their harder portions or areas as cutting points or faces.

DRILLING TESTS WITH CONGO BORT

By November, 1949, using Congo bort, two AX-size, bevel-wall, coring bits had been set, in one of which the bort were oriented in the hard vector directions and in the other in the soft vector directions. Setting diamonds in a bit mould with the stones oriented in hard vector directions proved to be less difficult and time consuming than anticipated, as it required less than twice as long to set the stones in such a manner than it did to set them in the random fashion. One additional bit also was set in the normal random fashion, for comparative purposes, by a clerk-typist who had no previous diamond bit-setting experience. Drilling tests involving these three bits were

completed in January, 1950 and the results of the tests on these first three bits are given in Table I.

Even though the desired orientation of all the diamonds, according to the intended vector directions, was not achieved in either the hard or soft vector bits, the test results were startling, in that there was a 10 : 1 ratio in diamond loss per ft. drilled between bits in which the major portion of their diamonds were set in soft and hard vector directions.

The differential between the first soft and hard vector bits tested was so great that it was realized that many additional tests would have to be performed before a positive trend could be established and the possibility of an accidental coincidence eliminated. Therefore, additional experiments were planned that would require several years to complete.

TABLE I

	Vector orientation		
	Soft	Random	Hard
Number of stones in each bit.....	148	148	148
Number of stones per ct.	8-12	8-12	8-12
Number of ct. per bit	14.37	18.11	15.35
Percentage of stones oriented in hard vector directions.....	22	36	84
Ft. drilled per bit	59.3	75.2	84.1
Average rate of penetration, in. per min.	2.70	3.01	3.07
Diamond loss per bit, ct.	3.41	1.21	0.45
Diamond loss per ft. drilled, ct.	0.058	0.017	0.005
Percentage of salvaged bort which was resetable	76	93	97
Cu. ft. air used per ft. drilled.....	1,065	934	915

All coring bits produced at Mount Weather that are to be used for experimental purposes are AX-size, bevel-wall bits cast-set in permanent-type, eight-piece, steel moulds.

Two alloys are used as the matrix in experimental bits. One consists of copper with 3.96 per cent beryllium and is used in the majority of the bits, and the other is nickel with 0.69 per cent chromium and 2.66 per cent beryllium. When properly heat-treated, the maximum Rockwell "C" scale hardness of the copper-base alloy is about 40, whereas for the nickel-base alloy the maximum is about 55. The nickel-base alloy was used as a matrix only in the four series "B" experimental bits that were tested on field projects under actual operating conditions, and not in the porphyritic greenstone (a term used at Mount Weather instead of saussuritized dacite porphyry), test-rock at Mount Weather.

Experimental diamond bits are tested in a 30 ft.-thick layer of rock in the Mount Weather Experimental mine. This particular dike or sill is a very uniform rock of even texture, from which AX-size cores are normally extracted in virtually unbroken pieces equal in length to the 4 ft. runs made with a 5 ft. rigid, double-tube core barrel. This type core barrel is used in all the experimental drilling tests at Mount Weather, which, from the standpoint of a diamond driller, is somewhat similar to a fine-grained granite in hardness and drillability.

DRILLS AND ACCESSORY EQUIPMENT USED

Two different drills were used in the tests on the experimental bits. Drill "A" was used in testing most of the bits in the series "A" bits, and drill "B" was used in testing all of the bits in the experimental series "D." Drill "A" is a small, column-mounted, screw-feed, underground-model diamond drill, with a power unit consisting of a three-stage, rotary air motor developing 20 h.p. at 3,000 r.p.m. with air at 80 lb./sq. in. motor inlet pressure. It was equipped with 200, 400, 600, and 1,000 feed gears. This drill was used but a short time when it developed unsatisfactory operational characteristics and was replaced by drill "B." Before drill "B" was used on any of the experimental bits, its operational characteristics were determined by making drilling tests on eight commercially set bits.

Drill "B" is a small, column-mounted, screw-feed, underground-model diamond drill with a power unit consisting of a high-torque, rotary-type air motor, which, when operated on air at 80 lb./sq. in. motor inlet pressure, develops from 16 h.p. at 1,500 r.p.m. to 19½ h.p. at its maximum speed of 2,500 r.p.m. Drill "B" was equipped with 200, 400, 750, and 1,300 feed gears.

Both drill "A" and drill "B" were equipped with feed screws 2 ft. long and were rated by their manufacturers as having a capacity of 500 ft. of E rods.

The core barrel used was a 5 ft., AX size, rigid, double tube that has been found to be satisfactory for use in the uniform, unbroken, saussuritized dacite porphyry with 100 per cent core recovery obtained.

DRILLING PROCEDURE

The control and metering devices used in conjunction with the diamond drill at Mount Weather make it possible to maintain a predetermined set of drilling conditions that can be duplicated and imposed in successive tests involving different experimental bits. Through the use of these control devices, the pressure of the air entering the motor inlet is maintained at 80 lb./sq. in., and the volume of water is held at 5 gal./min. Water pressure normally ranges between 50 and 60 lb./sq. in.

Precautions taken to ensure smooth drilling operations and eliminate undue stresses on the experimental bits being tested are:

- (1) Rod vibration is not tolerated; rods are kept well-greased, and any piece of equipment that develops a flaw or becomes worn and out of balance is replaced immediately.
- (2) Experimental bits are never used in collaring a hole; bits used for collaring holes are utilized to start a new hole and to drill through the greenstone and into the saussuritized dacite porphyry layer.
- (3) At no time is an experimental bit permitted to run over a broken core or started on a dirty bottom.
- (4) If a block occurs, which rarely happens in the uniform test rock, drilling is stopped immediately, the block is removed, and the hole cleaned out before drilling is resumed. Grinding of core with an experimental bit is not permitted.
- (5) Collaring bits and reaming shells are replaced before their O.D. is reduced to the point where the experimental bits would have to be reamed into a test hole.
- (6) Gradual acceleration and deceleration of the drill is always practised.
- (7) An experimental bit is never started from a dead position in contact with the bottom of a hole.
- (8) To eliminate one chance of jamming the 5 ft. core barrel, only 4 ft. is cored between pulls.
- (9) All experimental bits are run in closely spaced near horizontal trending holes for a distance of 20 ft. The num-

ber of 20 ft. intervals required to test each bit depends on how quickly it becomes dull.

It has been found that bits that were not permitted to exceed a rate of penetration of 4 in./min. in 400 feed gear gave the best performance. Bits started in 200 gear or forced to penetrate at a rate exceeding 4 in./min. in 400 feed gear suffered high diamond losses, and the footage drilled per bit decreased.

As the result of the precautions taken and knowledge gained from experience in testing other bits, the tests involving experimental bits are run as follows:

When a new experimental bit is put into operation, the throttle on the drill is opened just wide enough to maintain a bit r.p.m. of about 1,600; thus, in 400 feed gear the rate of penetration would be about 4 in./min. As the bit is gradually dulled, the throttle is advanced enough to keep the rate of penetration as near 4 in./min. as possible. Eventually each bit is worn to the point where full throttle is required, and a full-throttle position is maintained on the drill until rate of penetration for the bit being tested drops to 2.8 in./min. or less for two consecutive 2 ft. runs of the feed screw. At that point, the machine is shifted into 750 feed gear, and the drill is operated at full throttle until rate of penetration drops to 2.0 in./min. or less for two consecutive 2 ft. runs of the feed screw. When the bit is dulled to the point where full throttle on the drill in 750 feed gear will not make the bit penetrate at a rate exceeding 2.0 in./min., the bit is retired and considered ready for resetting.

While these tests are being run on experimental bits, two men are used on the drill, one acting as an operator and the other as a recorder and drill helper. The following information is recorded during a test: Distance of bit advance; Time it takes screw and bit to advance a measured distance, usually 2 ft.; Liné air pressure; Air pressure at motor inlet; Average cu. ft. of free air at 80 lb./sq. in. consumed per minute; Average pressure of water being circulated through the drill rods and bit; Volume of water (in gallons per minute), circulated through the drill rods and bit; Feed gear being used; Comments on quality and quantity of core recovered; and notations on any unusual wear on bit crown which is observed at 4 ft. intervals. From this information, recorded at the test site, the data covering the performance of each bit is compiled and entered on permanent record sheets.

DIAMONDS USED IN EXPERIMENTAL BITS

In the main, only two grades of diamonds, both ranging from 8 to 12 stones per carat, were used in the experimental orientation bits to date. The two qualities or grades of diamonds used were Congo and AAA-grade West African bort. However, a few bits containing stones of other sizes and grades were used in experimental bits, series "C."

Bits in any one test series were set with diamonds selected indiscriminately from a single batch, purchased from a supplier who had selected them from a single lot of diamonds. Thus, diamonds used in a specified series of experimental bits came from a single lot, and one possible source of difference between the diamonds used was eliminated.

When drilling tests were completed on a bit, the crown was given a deep acid etch, which partly removed the matrix and exposed the diamonds enough so that by using a 4 in. focal length binocular loop, the number of diamonds that had been set in hard and soft orientations could be determined and recorded. The crown was then returned to an acid bath, and the diamonds were freed from the matrix. The freed diamonds were then cleaned, dried, and weighed.

After the first weighing, which determined the total recovery of both scrap and usable bort, the diamonds were carefully sorted into scrap and resettable groups, and each group was weighed. Both the number and weight of the resettable stones were recorded. Total diamond loss per bit, in carats, was determined by subtracting the carat equivalent of the scrap credit and the weight of the salvaged resettable stones from the number of carats set in each bit before testing.

DIAMOND-ORIENTATION TESTS CONDUCTED

The bits to date in which the diamonds have been oriented in the crowns have been grouped into four series. The preliminary results summarized in Table I were obtained from the first three bits tested in the series "A" group.

Nine bits are included in the test series "A" group. They were set with Congo-grade bort, ranging in size from 8 to 12 per carat and cast-set in beryllium-copper matrix. The number of bits set in the various orientational directions was as follows: 3 bits—diamonds set in hard vector orientations; 3 bits—diamonds set in soft vector orientations and 3 bits—diamonds set at random. Of the latter, one bit was cast-set at Mount Weather and two bits were cast-set by a commercial setter.

Results of the drilling tests involving the bits included in the series "A" group are summarized in Table II. As regards test series "B," four AX-size, bevel-wall, coring bits cast-set in beryllium-nickel matrix and containing Congo-grade bort ranging in size from 8 to 12 per carat

TABLE II

Diamond orientation	Soft	Random	Hard
Number of bits included in averages	3	3	3
Diamond grade	Congo	Congo	Congo
Number of stones per bit	148	148	148
Diamonds in original bits, ct. per bit	14.06	14.62	15.37
Percentage of diamonds oriented in hard vector directions	16	69	90
Ft. drilled per bit	56.6	59.2	73.0
Average rate of penetration, in./min.	2.81	2.75	3.00
Diamond loss per bit, ct.	2.84	0.81	0.71
Diamond loss per ft. drilled, ct.	0.050	0.014	0.010
Number of resettable diamonds salvaged, per bit	108	135	141
Cu. ft. air consumed per ft. drilled	1.087	1.221	1.034

were produced at Mount Weather and sent to field projects, where they were used in core-drilling operations under actual operating conditions. These four bits, oriented in hard vector directions, were sent to the project engineer along with a group of commercially set bits with no instructions as to how and where they should be used. Neither the project engineer nor the drill operators were aware that there were four experimental bits in the group of bits sent.

The average results obtained are summarized in Table III.

SERIES "C" TEST

Ten bits were used in the series "C" test. Half of the bits were set at Mount Weather with the stones oriented, and the other half were set in the normal random fashion by a company producing commercial bits. All bits were cast-set in beryllium-copper matrix, and the bits in each pair contained the same number of carats and an equal number of stones selected from a single packet of diamonds. Bits included in series "C" were tested in core-drilling operations done in gneiss under actual operating conditions. Bits were sent to the foreman on the drilling project with instructions that he have each pair of bits run consecutively

in the same hole. Pairs were listed by number, and the foreman was not informed as to the differences in the bits. Results of the tests are summarized in Table IV.

TABLE III

	Commercially produced, random-set bits	Hard-vector oriented bits produced at Mount Weather
Formation core-drilled ...	Quartzite	Quartzite
Diamond quality	AA W. African	Congo
Number of bits used	17	2
Ft. drilled per bit	19.2	22.5
Diamond loss per ft. drilled, ct.	0.333	0.170
Formation core-drilled ...	Broken limestone	Broken limestone
Diamond quality	AA W. African	Congo
Number of bits used	6	1
Ft. drilled per bit	53.0	40.0
Diamond loss per ft. drilled, ct.	0.606	0.390
Formation core-drilled ...	Quartz latite	Quartz latite
Diamond quality	Congo	Congo
Number of bits used	5	1
Ft. drilled per bit	42.3	56.0*
Diamond loss per ft. drilled, ct.	0.046	0.033

*In addition to 56.0 drilled in quartz latite, this bit was used to core an additional 45.5 ft. of cement.

Fifteen bits are included in the series "D" test, all of which were cast-set at Mount Weather in beryllium-copper matrix, and drilling tests were conducted in the saussuritized dacite porphyry test rock in the experimental mine. All bits were set with AAA-grade West African bort ranging in size from 8 to 12 per carat. All the stones used in the series "D" bits were taken from a single packet of diamonds selected from a single lot.

TABLE IV

Vector setting	Diamond quality	Average number of stones per ct.	Ft. drilled per bit	Ct. loss per ft. drilled
Hard	Congo	15	17.0	0.089
Random	Congo	15	7.0	0.159
Hard	AAA	11	45.0	0.023
Random	AAA	11	9.0	0.021
Hard	AA	11	28.0	0.047
Random	AA	11	5.0	0.138
Hard	AA	20	27.0	0.086
Random	AA	20	10.0	0.195
Hard	A	11	20.0	0.079
Random	A	11	15.0	0.159

Bits in test series "D" represent the first stage of a series of tests in which some of the factors involved in the oriented setting and resetting of diamonds in cast-set bits will be investigated thoroughly. The diamonds allotted to each of the series "D" bits were weighed, and then a three-way classification was made of each one of the 148 stones assigned to a single bit.

The stones assigned to each bit were first divided into eight groups according to colour; then the stones in each colour group were subdivided into their dominant crystallographic forms. The stones grouped under each dominant crystal form having the same colour are further subdivided as follows: (1) Unspotted; (2) Spotted (contain dark inclusions); (3) Flat (deformed crystal); (4) Twinned (other than macles); (5) Macles (twinned octahedrons); (6) Frosted, coated, or eroded; (7) Flawed (contain visible cracks); (8) Broken (part of crystal broken off or abraded).

Results of drilling tests involving the 15 bits included in the series "D" group are summarized in Table V.

TABLE V

Diamond orientation	Soft	Hard
Number of bits included in averages	5	10
Diamond grade, West African bort	AAA	AAA
Number of stones per bit	148	148
Diamonds in original bits, ct. per bit	14.49	14.61
Per cent of diamonds oriented in hard-vector directions	43	65
Ft. drilled per bit	71.8	92.8
Average rate of penetration, in./min.	3.30	3.34
Diamond loss per bit, ct.	1.59	0.78
Diamond loss per ft. drilled, ct.	0.022	0.008
Number of resettable diamonds salvaged per bit	131	141
Cu. ft. of air consumed per ft. drilled	1,100	1,065

In subsequent tests, in which the AAA-grade diamonds from the series "D" group of bits will be used, the three-way classification of the diamonds before setting and after salvage will be continued.

The five bits in which the diamonds were oriented in soft-vector directions will be cannibalized. Bits will be reset with the bort set in soft-vector directions, using only the resettable stones recovered as salvage. This cannibalization process will be repeated until less than 148 of the original 740 stones remain. Thus, it will be possible to determine the cumulative effect of repeatedly resetting the same diamonds oriented in soft-vector directions in bit crowns. This cannibalization process will also be used on five of the bits originally set with the stones oriented in hard-vector directions, but in this case the stones will be reset repeatedly in hard-vector directions. A comparison can thus be made on the cumulative effects of repeatedly resetting the same stones in both the hard- and soft-vector directions. The stones from the five remaining bits included in the "D" group will be reset in hard-vector directions, but new diamonds will be added to those salvaged each time the stones from an individual bit are reset.

EXPERIENCE GAINED IN SETTING AAA-GRADE STONES

From experience gained in setting the AAA-grade stones used in the "D" group, it was found that the crystalline form of the dodecahedral diamonds was such that, if they were set in the random fashion, the chances for their being placed in the bit mould in hard-vector orientations were greater than for any other crystal form except the trisoctahedron. The author has noticed that in West African bort the percentage of dodecahedral crystals is generally much greater in the higher-quality stones. The higher percentage of dodecahedral forms in the higher-quality stones may possibly be one of the principal reasons why bits set with the high-quality stones consistently out-perform those set with lower-quality stones. Bits random-set with high-quality stones out-perform those set with lower-quality stones, because the greater number of dodecahedron-shaped stones increases the chances for a greater percentage of the stones to be set in hard-vector directions.

BIBLIOGRAPHY

- Kraus, E. H., and Slawson, C. B., Variation of Hardness in the Diamond: *Am. Mineralogist*, 24, 1939, 661-676.
 Kraus, E. H., and Slawson, C. B., Cutting of Diamonds for Industrial Purposes: *Am. Mineralogist*, 24, 1941, 154-156.
 Slawson, C. B., Diamond-set Tools: *Am. Mineralogist*, 27, 1942, 162-191.
 Whittaker, H., Report on Substitution of Lower Quality Diamonds in Diamond Dresser Tools: Oct. 16, 1944.
 Whittaker, H., and Slawson, C. B., Vector Hardness in Diamond Tools: *Am. Mineralogist*, 31, 1946, 135-167.
 Winchell, H., Observations on Orientation and Hardness Variations: *Am. Mineralogist*, 31, 1946, 135-167.
 Slawson, C. B., Development and Trends in the Use of Industrial Diamonds: *Am. Mineralogist*, 31, 1946, 135-167.
 Slawson, C. B., and Kohn, J. A., Maximum Hardness Vectors in the Diamond: *Industrial Diamond Review*, 10, 1950, 168-172.

REVIEWS

An Introduction to Metalliferous Mining.—By S. Higham. 1951, London: Charles Griffin & Co. Ltd. Pp. 337. Figs. 265. 5½ x 8½ in. Price 30s.

The author, who is the founder and head of the Mining Department at the Technical School, Bulawayo, Southern Rhodesia, claims nothing new for this work, but he might well have claimed the achievement of a new standard of simplified exposition of metalliferous mining. His book, which was published in the earlier part of the year, is essentially an introduction—precise, almost in note form, yet every branch of underground practice is dealt with, together with basic principles and types of equipment used.

Beginning with a brief introductory note on the origin and shape of ore deposits, Mr. Higham deals in turn with prospecting, boring technique, and equipment used for the breaking of ground. A chapter on the Development of Mines is followed by chapters on the support of underground workings, shafts and shaft sinking, underground development and stopping. Drainage and ventilation are discussed as to principle and plant. In conclusion, there is a very brief chapter on underground lighting and a more comprehensive one on underground transport which, however, makes no reference to the use of conveyors.

Although written mainly for Bulawayo, the author has drawn to a considerable extent on Rand mining experience, but he gives little indication of developments in large scale mining, more particularly in the United States, e.g., the use of continuous miners, trackless shuffle cars, etc. Moreover, the human factor is not at all taken into account, and nothing is said about safety or labour management—a somewhat surprising omission in a book on mining, of all industries. It may be hoped, however, that the publishers, who have already been responsible for so many interesting works on geology and mining, may find it possible to deal with these important matters in a separate publication.

The Northampton Sand Ironstone.—By S. E. Hollingworth and J. H. Taylor. Pp. viii + 211. Figs. 18; Plates VI. 6½ x 9½ in. H.M.S.O. Price 17s. 6d. net.

Under the general title "The Mesozoic Ironstones of England" a series of memoirs is in course of preparation by the Geological Survey of Great Britain, describing the Jurassic and Cretaceous sedimentary ironstones, responsible for over 95 per cent of our home production of iron-ore. The present volume deals with the ironstone of Inferior Oolite age, extensively worked in Northamptonshire, Rutland, East Leicestershire and South Lincolnshire. Indeed, since the middle of last century, the Field has yielded a total of about 250,000,000 tons of ore. It gives results of work conducted by the Survey since 1939 when, on the outbreak of war, its activities were concentrated wholly on economic investigations.

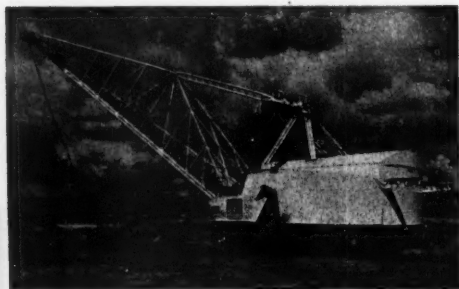
The Northamptonshire Sand Ironstone Field was mapped on the scale of six in. to one mile by members of the Survey's Ironstone Unit.

The book deals with the stratigraphy, structure and reserves of the field and also discusses its history and describes the methods of prospecting, sampling and working in common use. Forty-five new analyses of ironstone carried out in the Survey's laboratories, are published for the first time. However, it has been possible to publish only a small part of the information obtained during the field investigations, but a considerable proportion of the unpublished material is available to enquirers at the Geological Survey and Museum.

Giant Excavator for Iron Ore Mining

W 1400 Built by Ransomes & Rapier for Stewarts & Lloyds

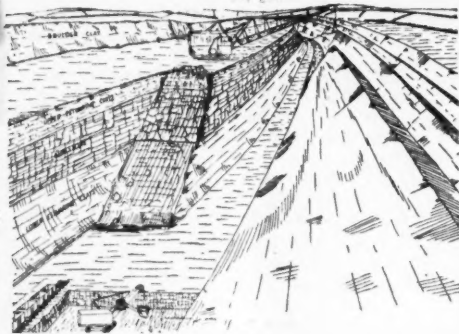
At Priors Hall Quarry near Corby, Northamptonshire, on Wednesday, October 31, what is claimed to be the world's largest walking drag-line went through its paces for the Press.



The W 1400 with its 282 ft. long jib in its working position 175 ft. above the ground

Its 22-ton bucket with a 20-ton capacity-reach scooped up the overburden—27 tons at each bite—slewed round to the discharge point, emptied the bucket and returned to the digging position in less than 60 seconds. The great jib, 282 ft. long and 175 ft. above the ground in its working position slewed easily back and forth, displaying its immense dumping radius of 260 ft. The 1,600-ton machine put its two 56-ton feet down and moved in seven-foot strides, equivalent to a speed of about 200 yards per hour. Impressive as these operations were, equally so was the fact that the machine is controlled entirely by one man.

The story behind the creation of the W1400 is more concerned with the depth of overburden to be removed than with the description of the early types of shovels; although it is worth mentioning that the first long jib shovel, built in 1900, is still at work in the Corby quarries. In those days the iron-stone was obtained by the "plank and barrow" method, which can only be used when the



A sketch showing the W 1400 working where overburden can be handled up to 100 ft. without the assistance of a secondary machine. It will be noticed that in order to achieve this the machine has to stand on the benching and dig below and above itself

overburden is not more than 15-20 ft. thick. As the overburden became deeper, however, less primitive methods had to be used, for the development of excavating machinery has been governed by the gradual increase in the overburden to be dealt with.

In deep quarrying, the distance at which the excavated soil can be dumped from the working position of the excavator depends on the dumping radius which in turn depends on the length of the jib of the excavator. Such was the position at Priors Hall Quarry, where the ore bed had become progressively deeper and in some areas the overburden was 100-ft. above the ironstone bed. At this depth it would, of course, be possible to strip the overburden by using two machines working at different levels, but this type of operation would be uneconomic.

The economic mining of the ironstone at depth was not, however, a problem which just blew up suddenly. Stewarts and Lloyds had long been aware that a new method of stripping the overburden would be necessary when a depth of 100 ft. was reached. In fact, several possible methods



A Ransomes & Rapier electrically operated 9 cu. yd. bucket removing overburden up to 50 ft. in depth.

were considered by the company and visits were paid to America and Germany to study their systems of opencast working, but none of the existing machines proved suitable.

Finally, it was decided that a very large walking drag-line, bigger than anything of its kind yet evolved, would be the best way of dealing with the problem. In November 1947 Stewarts and Lloyds placed an order with Ransomes and Rapier of Ipswich to design and construct a walking dragline with a capacity-reach of 20 cubic yards at 260-ft. radius to render possible the removal and disposal of 100 ft. of overburden. That Ransomes and Rapier should be entrusted with such a task was not surprising. The seven major mines serving Stewarts and Lloyds Corby iron and steel works are stripped by Rapier 5360 9-cubic yard shovels and not unnaturally very close contact has been maintained between Corby and the Ipswich from the time when the first Ransomes and Rapier 5360 shovel was designed twenty years ago.

The main particulars of W1400 given below will convey a good idea of the size of this machine as well as the difficulties which faced Ransomes and Rapier from the drawing board stage to actual production.

Length of jib ctr. of pulley pin to ctr. of foot pins	282' 0"
Capacity of bucket	20 cu. yd.
Angle of jib to horizontal approx.	30°
Radius of discharge—vertical	260' 0"
Max. allowable working load at max. radius	52 tons
Dump height at max. radius approx.	120' 0"
Clearance radius of cab	68' 6"
Centres of shoes	63' 0"
Width of house	49' 0"
Diameter of roller circle	47' 0"
Diameter of base structure	48' 0"
Area of base	1,809 sq. ft.
Two shoes, each	48' 0" x 9' 6"
Bearing area of shoes, each	445 sq. ft.
D.C. drag motors, 4 off KE13W cont. rated—blown, each	225 h.p.
D.C. hoist motors, 4 off KE13W cont. rated—blown, each	225 h.p.
D.C. rotate motors, 2 off KE13W cont. rated—blown, each	225 h.p.
D.C. walking motors, 4 off KE13W cont. rated—blown, each	225 h.p.
Motor generator sets, 2 off driving motors, each	1,500 h.p.
Drag rope, twin, each	7" circ.
Hoist rope, twin, each	6½" circ.
Jib hoist rope—10 parts	6" circ.
Working weight	1,650 tons
Ballast	Nil

Perhaps the two most spectacular features of the W1400 are the walking mechanism and the great jib.

THE WALKING MECHANISM

The walking gear was designed around the Cameron and Heath British patents and is a novel method of propulsion used exclusively on all Rapier walking draglines, the main features of which are concerned with the relief of all bending movements on the main walking shafts.

To distribute effectively the enormous load through the longitudinal girders to the walking axles, a deep transverse bridge girder is built into the superstructure as an integral part of the machine. When walking, two-thirds of the weight of the base is carried by a hook system connected to the underside of this girder. The axles for the walking eccentrics are built into each end of the girder and weigh nearly eight tons each. The two walking shafts are twenty inches in diameter and weigh 16½ tons each. The outer ends of the shafts are squared and fit into recesses in the eccentric bosses, while the inner ends are also squared to take the main driving wheels.

More than anything else, perhaps, these driving wheels give some indication of the enormous power required to actuate the walking mechanism. Each wheel weighs ten tons, is twelve feet in diameter and the teeth are 14 inches wide. Two pinions engage with each wheel at opposite points on the diameter to ensure that no bending moment from the tooth loading is exerted on the main walking shaft.

The heavy cast steel boss at the outer end of each shaft transmits the eccentric motion to the shoes through the walking legs, which are attached to the shoes by universal

ball connections. This universal connection is essential, owing to the irregular nature of the ground over which the machine operates. It is also possible that one shoe may slip a greater distance than the other and be forced out of parallel. To correct this and to return the shoes to their correct position after each step a novel type of return mechanism is employed. This device was invented by Cameron and Balicki and utilises torque tubes, linked through universal connections to the rear of each shoe, to return the shoes to their normal straight position each time they are lifted from the ground.

THE GREAT JIB

When it came to the design of the jib, it was natural that Stewarts and Lloyds, as the largest makers of steel tube in the country should have given some thought to its construction from tubular sections. In 1947, when design work on the jib was commenced, the longest tubular jib in existence was only about 30 ft. long, although by the end of that same year a jib of 113 ft. had been built of tubular construction. Thus despite the fact that the conception of a tubular jib 282 ft. in length was considerably in advance of anything then in existence, Stewarts and Lloyds agreed to make the necessary



Back view of the W1400 showing how at each step the rear of the tub rises about two feet. The front of the tub is resting on the ground

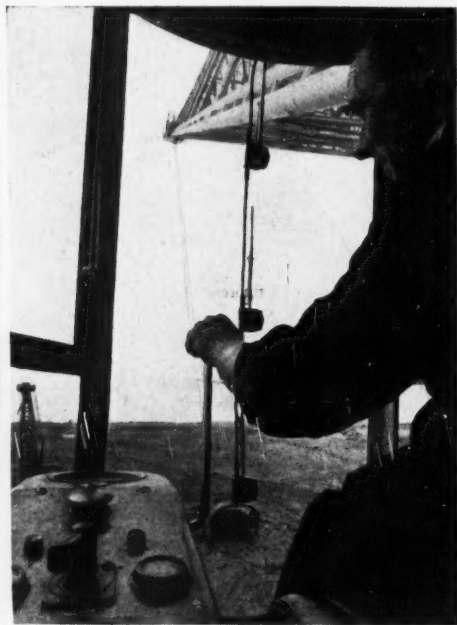
steel and from it the tubes for the jib. The design was evolved by Tubewrights Ltd., a subsidiary of Stewarts and Lloyds in collaboration with Ransomes and Rapier who had, of course, the overall responsibility for the entire machine. The main compression and tension boom members were designed as twin tubes with distance pieces welded in. Two main compression members run from the heel pieces to the head of the jib, and the main tension member from the head to the apex, where it bifurcates into a fish tail arrangement from the apex to the heel pieces. The main compression boom members taper from sixteen inches in diameter under the apex to ten inches at the head and fifteen at the heels. The main tension boom tapers from fifteen inches at the apex to five and a half at the head.

The twin tube system was also used in planning the "A" frame. The front and back legs are built into the machine housing, while the top forms an anchorage which, through the suspension member, holds the jib in the air.

When all matters regarding the design of the jib in relation to the performance characteristics required had been settled, the question of material to be used, method

of production and the technique of fabrication and welding had to be decided.

The construction of the jib called for tubes, plates and forgings, all to be made from a steel possessing high tensile properties and suitable for welding with a minimum of preheating or postheating. One of the many problems was that a large amount of welding would have to be done on the site, where the exposed position would present difficulties in providing protection from adverse weather conditions. After considerable research and experiment a special steel was evolved by Stewarts and Lloyds' department of research and technical development. This was a high tensile chromium-molybdenum fine grain steel, aluminium killed. For successful welding under the particular conditions anticipated, a fine grain steel was essential, and the McQuaid-Ehn grain size was specified as grade six or finer. This new steel was found to give better tensile properties, a higher yield point and to have less tendency to harden.



View from the seat of the operator who has a clear view of the quarry and the 20 cu. yd. bucket

When the jib was complete, it was considered that neither an estimated weight nor one calculated from the weights of the individual components would be sufficiently accurate, and so it was decided that the complete jib should be weighed. This was done by using Statimeters, which are like small hydraulic jacks fitted with pressure gauges. When weighed it was found to be 94 tons, which was within half a ton of the calculated weight. Subsequently, when the catwalk, suspension member and other accessories had been added, the weight was 126½ tons.

While the foregoing is only a very small part of the absorbing story which could be unfolded about this machine it is convincing evidence enough of the remarkable achievement of British enterprise and engineering skill.

Technical Briefs

The Use of Xanthates in Lead-Zinc Flotations

Friedrich Stolze (*Z. Erzbergbau u. Metallhüttenw.* 4, 68, 1951), has discussed research results on the use of xanthates in the flotation of sulphidic lead and lead-zinc ores of the Ruhr type. The author states that potassium iso-propyl xanthate is a very efficient accumulator and that it is economical in use. The xanthates of the higher alcohols are most satisfactory for the final preparation of the sludge and, therefore, it is desirable to work with mixed xanthates. The xanthates which have been used include potassium butyl, ethyl and propyl xanthate.

New Steel-making Process

Details of a new steel-making process, to be used in Austrian steelworks, based on oxygen converting, will be released at a congress of iron and steel producers, to be held during November at Leoben in Styria. Initial research on the process was carried out by Germany during the war. Since then, the Alpine Mining Company has continued research and has developed the process for industrial application. Works at Donawitz and Linz are reported to have produced large quantities of steel, on an experimental basis by the process. The product is said to be of an excellent quality, even superior to that of Siemens-Martin steel.

Power From Lignite

Studies which the U.S. Bureau of Mines have been carrying on in two pilot plants at the Denver Federal centre on the treatment of lignite and other low rank non-coking coals is about to be put into commercial operation, according to the regional director of the Bureau, Mr. J. H. East, Junior. As has been reported in some of our earlier issues, Alcoa is establishing a new aluminium production plant with a capacity of 85,000 s. tons a year at Millom County, Texas. Such a plant will require large supplies of electricity and this is to be generated by steam driven plant using as fuel char, produced from lignite by the Bureau's carbonization method. The Texas Light & Power Co. will build and operate the generating plant for Alcoa. This will consist of twelve 575-ton-a-day units. The Bureau of Mines has designed the first of these modelled on its pilot plants.

The products of the process are tar and char. The tar recovery cost from lignite containing 14 gallons of tar—though the higher class coals run as high as 45-55 gallons—will, it is stated, be relatively nominal, the lower grades of lignite should be able to compete with natural gas, the reserves of which are becoming limited. For the last ten years the price of natural gas has trebled, and long-term contracts are now unobtainable. It is estimated that mining costs for lignite will range between \$1 and \$1.50 per ton.

Summarized, the process consists of crushing the raw fuel to pass ½ in. mesh. The crushed product is then "boiled" at 350° F. in a fluidized dryer heated by the products of combustion or flue gases. The dried fuel is then moved pneumatically to a carbonizing reactor in which it is burnt with air at a temperature of 950° F. yielding tar oils and a char, with an overall thermal efficiency of about 91 per cent. With a throughput of 7,000 tons of lignite a day, an output of 3,200 tons of char and 2,300 bbl. of tar are estimated.

The process is applicable to synthetic liquid fuel production. The tar oils can readily be hydrogenated to produce synthetic liquid fuels ranging from heavy industrial fuel oil to aviation gasoline. It can also be used to extract oil from oil shale fines, at present discarded.

Machinery & Equipment

Recovering Gold with the Howard Rotavator

Less than four miles from where George Honeyball discovered Witwatersrand's first gold reef, Howard Rotavators, made by Rotary Hoes Ltd., East Horndon, Essex, are being used to recover gold from old mine dumps. The site is that of the original Robinson Shaft, sunk in 1894, and the mine dumps on which the Rotavators work have been left since the heyday of the Transvaal gold mining industry, when methods of retrieving gold were not as efficient as they are to-day. The gold content of the old dumps is thus comparatively high and well worth recovery with improved extraction processes now available.



The Howard Rotavator "Gem" in action on the mine dumps left on the site of the Robinson shaft

The Victory Gold Recovery Co., which is working the site, began operations a few years ago. At first, labourers were used to break down the dumps with pick and shovel as a preliminary to extraction. However, this method was slow and costly, and tended to be inefficient; for even when pick and shovel has been used, large lumps remained which were not suited to the next stage of the process—the passing of the sand through a fine wire screen. This difficulty was, however, overcome by the use of the Howard Rotavator "Gem" (see illustration) which prepares the dumped sand for amalgamation and extraction in a single operation. In fact, it has been estimated that the Rotavator does the work of approximately 44 native labourers.

The Howard Rotavator "Gem" Series III, put to this new industrial use, is equipped with a 6 h.p., single fly-wheel fan. The work is done by a specially bladed rotor with a working width of 20 in. (18 in. and 24 in. models can be supplied to order). Special pickline rotors are available for working very stony and heavily compacted soils. The depth of work is adjustable in half-inch stages to a maximum depth (in most soils) of 9 in.

An interesting point is that when the extraction process is complete, the sand is spread back over the old ground, leaving a hard and level site suitable for building operations.

B.T.R. Long-Life and Pitmaster Conveyor Belts

Recent examples from many reports relating to the performance of B.T.R. Long-Life Conveyor Belts include some impressive facts about two installations at Middlesbrough. At the ore grading plant operated there by Dorman, Long & Co., Ltd., a 54 in. Long-Life belt has carried 2,575,000 tons of ore from primary to second crusher and is still running. A 48 in. belt delivered 2,467,000 tons from

secondary crusher to screens before its recent replacement. At this plant, three B.T.R. wharf sinter belts, 36 in. x 8-ply, have carried 567,670 tons of hot sinter at an average belt cost of 1.14d. per ton.

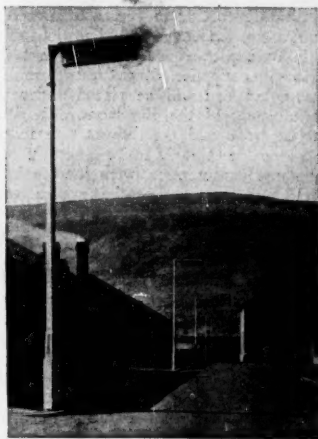
A 42 in. x 7-ply B.T.R. belt with rayon reinforcement, carrying the main supply of crushed ore in the crushing plant of the Cargo Fleet Iron Co., Ltd., has a record of 1,079,811 tons in three years' service and is still in first-class condition. This represents a belt cost of about 1d. per ton. Of special interest is that belt stretch has been very considerably less than 1 per cent.

For underground service, the B.T.R. Co. has recently introduced a special belt under the brand Pitmaster, the first of which has just been put into work at Ryhope Colliery, Durham. The fitting and splicing of this belt—a 42 in. x 7-ply high-tensile job, 7,500 ft. long—was typical of B.T.R. planned efficiency. It was delivered to site in 630 ft. coils, weighing 3 tons each, prepared at the factory for Tylock splicing underground.

The Conveyor structure was designed, built and installed by Hugh Wood & Co., Ltd., a drive head of 150 h.p. being provided. All work was completed by scheduled date during the annual holiday, thus avoiding loss of coal production.

Fluorescent Lighting Adds to Pit Head Amenities

Fluorescent lighting is now improving the amenities at Beynon Pit, Blaina, Monmouthshire, where ornamental gardens have been laid out at the pit top, near the miners' bath houses, and the more cheerful atmosphere thus created can be appreciated by the night shifts in the light from G.E.C. "Three-Eighty" fluorescent lanterns. As the accompanying illustration, which is reproduced by courtesy of



G.E.C. "Three-Eighty" fluorescent lanterns installed in the improved pit head area at Beynon Pit, Blaina, Mon.

Mr. G. E. Aaron Thomas, Chairman, S.W. Division, N.C.B. shows, the design of the lanterns and special 25 ft. concrete utilities columns is in keeping with the improved daytime appearance of the pit head area.

Three 5 ft. 80W. warm white fluorescent lamps are used in each lantern and the average illumination of the 25 ft. roadway is 6,080 lumens per 100 ft. linear, the lanterns being mounted at 25 ft. with a spacing of 105 ft.

Metals, Minerals and Alloys

The re-armament programme in the U.S. is now beginning to pass from the blue print stage into more active execution and this will entail increasingly drastic curtailment of supplies to producers of purely civilian products. The Defence Production Administration has issued a fresh appraisal of the relative scarcity of the various metals arranged in three groups. The first includes those which are insufficient for defence and civilian demands; the second those in which supplies are in approximate balance; while the third comprises those which are in fairly good supply. In the first category of most critical materials we find copper, aluminium, lead, tin, zinc, platinum, cobalt, columbium, molybdenum, tungsten and nickel. Of these copper is said to be the most critical both for the immediate and long range outlooks.

Copper.—The growing scarcity of copper is not peculiar to the U.S. and is illustrated by the far higher prices being paid on the Continent. Thus the production from the new Paipote plant in Chile which started up on October 30 has been sold for one year to Western Germany at 52c. per lb., compared with the U.S. export figure of 27½c. This production, expected to amount to 18,000 tonnes of blister annually, is to go to the Norddeutsche affinerie at Hamburg for refining, according to a Chile report since contradicted in Hamburg. This price is more than double the American domestic price. French consumers have now to pay Frs. 50 per kilo. premium. These prices lend further support to the belief that controlled prices in the U.S. and the U.K. will have eventually to be raised, even if the substitution of aluminium in various directions be widely accepted. The N.P.A. anticipates that the copper scarcity may last for four or five years.

Lead.—Allocation orders in regard to domestic lead to U.S. consumers are suspended and allocations of imported metal are in consequence postponed, so that consumers may use November supplies without restriction. Ultimately however, imported lead will be placed under allocation. The price ministers of the Commonwealth States at a conference last week said that efforts to stabilize prices of lead and zinc are unlikely to be successful unless the quotas for home consumption were increased. In West Germany lead supplies are said to be excellent with stocks computed at around 40,000 tonnes and efforts are being made to increase export sales of lead semi-fabricates.

Tin.—Some surprise has been expressed at the addition of tin to the latest list of most critical materials in the last appraisal by the Domestic Production Administration on the supply of metals in the U.S. Supplies according to the Department of Commerce have been declining recently at a rate of some 2,500 tons monthly. The D.P.A. gave the Government's supply at the end of June as 29,446 tons of tin in metal and concentrates; and the amount in private hands was 23,794 tons, making a total of 53,260 tons. The U.S. Government has for a considerable time past been the sole purchaser of tin but how much, if any of their total supply is destined for stockpile is unknown.

It was stated at the Johnson Committee Hearing in the Senate last February that the stockpile exceeded that held at the time of Pearl Harbour, which has been reported at 151,941 tons. General Wilson, interviewed this week in Singapore, said that U.S. tin supplies were "comfortable" and there was no shortage. The U.S. Bureau of Mines reports that 35,481 s.tons of secondary tin were recovered in 1950 compared with 24,901 tons in 1949.

Straits shipments in October were 4,558 tons as compared with 6,375 tons in September. Shipments are thus now coming more into relation to the monthly figures of production. Destination of shipments was: Europe 2,361; British possessions 1,079; U.K. 722 and miscellaneous 396 tons. No time has been lost in announcing that the new Colonial Secretary, Mr. Oliver Lyttelton, will visit Singapore, Malaya and Hong Kong at an early date. The new Colonial Secretary has the advantage of a long association with the tin industry both in London and the Far East, and though no doubt how to deal with the bandits will be one of his chief problems, the question of constructive policy in the future with regard to the tin industry will no doubt receive his attention. The U.S. tin mission arrived in Singapore on Tuesday.

Output of the Texas City Smelter in October is reported as 2,140 tons (September 2,155) and the total for the ten months 27,359 tons. The output is now running at about a thousand tons a month below the figures for the first four months of the year.

Zinc.—U.S. zinc consumption in the first half of the year is computed at 444,073 s.tons compared with 466,964 s.tons in the same period of last year; reduction was entirely in the galvanized zinc trade, other branches of consumption being practically unchanged. The Mexican output in the first half of the year is given as 100,509 s.tons practically at the same rate as in 1950. However, the secretary for national economy says that the uncertainty of international markets caused by U.S. price cutting and foreign political moves reduced the output in August. He said that their mineral exports would now be diverted in great part to European markets where they could secure prices considerably higher than the U.S. ceilings.

The Quebec Minister for Industry and Commerce stated last week that a zinc refinery would be set up in the Province as soon as a decision was come to regarding the site, which will be on the shores of the St. Lawrence near a hydroelectric plant.

Zinc production in Western Germany amounting currently to about 12,000 tons of raw zinc and 3,000 tons of remelted monthly is considered adequate for all requirements, especially as some 6,000 tons of metal are due to be imported before the end of the year.

Aluminium.—Mr. Fleischmann, U.S. Defence Production chief, has expressed himself sanguine regarding aluminium production and thought the present expansion goal (1,528,000 s.tons by the end of 1952) had been nearly reached after which the target might be further raised. This achievement would mean a greater use of aluminium in substitution for copper. In Germany, a substantial increase in output has been secured this year, production being over 8,000 tonnes in September compared with 3,500 tonnes in February.

Chromium.—Imports of chromite into the U.K. in September were 15,239 tons (7,449 in August). Imports in the first three-quarters of the year were 107,862 tons compared with 84,444 tons a year ago.

Cobalt.—U.K. September imports of cobalt were heavily down at 59,700 tons (387,808 in August).

Graphite.—The U.K. imports in September were 921 tons compared with 458 tons in July.

Tungsten.—There is no real change to report in the market, though prices are a little easier since our last. The U.K. figure may be called 515/525s. c.i.f. The Continent is taking all the supplies they can get at 520s. f.o.b. and 525s. c.i.f.

Uranium.—Reviewing the results of the drive for larger supplies of uranium containing minerals, Mr. Jesse Johnson, U.S. Director of raw materials in the Atomic

Energy Commission, said that developments in Canada had been successful, possibly even more so than in the U.S. South Africa and a number of other countries would soon be on the list of important producers. In this connection, British and U.S. representatives have arrived in South Africa for further talks with the Union authorities on the production of uranium from auriferous ores. Mr. Johnson appealed to the Spanish American Republics to make a thorough assessment of their potentialities as producers, as they contain very favourable areas as yet relatively unexplored for uranium.

Gold.—The Western Australian output in September was 46,933 f.o.z. The Colombian production in July was 38,006 f.o.z. and the aggregate for the first seven months 257,978 f.o.z. (224,923 in the same period of 1950). The output of Ontario for the first eight months of the year was 1,596,000 f.o.z. against 1,612,307 f.o.z. a year ago. The Bank of Japan is to arrange for priority financing of gold mining, since Japan's gold holding must be increased before the country is admitted to the International Monetary Fund. Low interest loans will be granted to any mine showing good grade and enquiries for such mines are being undertaken.

Platinum Metals.—Recent reports by the U.S. Bureau of Mines throw some light on the platinum metals trade in the first half of the current year. Speaking generally, platinum business was less active than in 1950—an improved demand towards the end of the period being offset by small supplies; the jewellery and decorative trades in particular showed the chief declines. Interest in palladium on the other hand appears to have developed for which no doubt the big difference in price was chiefly accountable. Sales of platinum to domestic consumers are estimated at 110,082 oz. Platinum imports were 94,758 oz., compared with 204,979 oz. for the whole of 1950. Palladium sales were 114,674 oz., industrial consumption showing a sharp increase. Imports of palladium were 134,134 oz. as compared with 147,173 oz. for the whole of 1950. No imports either of platinum or palladium seem to have been made from the U.S.S.R.—Canada being the main source of the U.S. supply. Colombian crude platinum exports appear to be on a declining scale as the six months' total was only 12,504 oz. South Africa supplied 594 oz. of unrefined in the second quarter of the year, and 24,524 oz. of refined for the full period.

The London Metal Market

(From Our Metal Exchange Correspondent)

Prices have continued to fluctuate within narrow limits but with a reduced turnover during the week. There has been no change in the general situation as reflected in the market, and with the U.S./Bolivian discussions now suspended, the only matters of an official nature which are likely to cause disturbance, are possible reports of the activities of the American Committee of Investigation now in the Far East. In America itself there now appear to be two voices speaking on the subject of tin, R.F.C. saying that they have plenty of tin in stock, whereas the Defence Production Administration has listed tin as one of the articles in critically short supply.

The position in other metals remains unchanged and there is little indication that the international allocation scheme for copper and zinc is having any real effect on either distribution or prices. At the moment the prices obtainable in Western Europe are approximately as follows:

For copper nominally £500 if metal with payment in sterling is available, and about 55c. per lb. with payment in

dollars; for g.o.b. zinc, £285 per ton and 31c. per lb. respectively; for lead, £215 per ton and 23c. per lb. The demand for the first two metals is far in excess of the supply, but in the case of lead a state of equilibrium is being established. It is understood that prices ruling behind the Iron Curtain are sufficiently high to enable unscrupulous people in the West to purchase at the above prices and re-sell at a profit.

On Thursday the official close on the tin market was: Settlement price £1,000, Cash Buyers £995, Sellers £1,005; Three months' Buyers £967 10s., Sellers £970. In the afternoon the market was steady. Turnover for the day was 110 tons. Approximate turnover for the week was 755 tons.

The Eastern price on Thursday morning was equivalent to £986 12s. 6d. per ton, c.i.f. Europe.

Iron and Steel

Problems of the production of ample tonnages of iron and steel and their equitable distribution engage more immediate attention than the prospect of the return of a recently nationalized industry to private ownership. There is no room for doubt that industry is in dire straits for steel. Nor is this scarcity peculiar to the United Kingdom. The whole world is hungering for steel. Producers cannot keep pace with a demand which has been enormously swollen by the race to re-arm, and defence priorities seriously restrict the tonnages available for commercial activities.

Increased productivity is prescribed as the sovereign remedy for most of our economic ills, but at every turn industrial activity is frustrated by the steel shortage. As one spokesman of the steel using industries put it: "If there is insufficient steel to maintain peacetime work, what choice have we now that re-armament is imposed?"

It is not only the steel using industries that are affected. At a time when the output capacity of the steel plants should be engaged to the limit, there is much short time working in the melting shops and at the rolling mills. Most of the big producers have had to reduce the number of weekly shifts worked and the workers who are paid on tonnage rates are becoming restive because of the smaller content of their pay packets.

It is a vicious circle of restrictions which arises from shortages of raw materials. To some extent the scarcity of ore has been mitigated by the acceleration of imports and the rising output of indigenous ironstone. Coke supplies are barely sufficient, and deliveries of scrap totally inadequate. The quest for foreign scrap has been attended with little success, and the home scrap drive has not received the impetus anticipated since prices were increased. Steel makers are still encroaching upon their stocks which at the end of September had fallen to a near all time low level of 305,000 tons. It is stated that at current rates of use, the stock level represents only about ten days' consumption.

To all these difficulties is added that of distributing limited supplies of iron and steel to the best advantage. Every consumer is anxious about his allocation under the new scheme and even before these are issued there are criticisms and clamour for modifications. Already exports have been severely cut and further restrictions are foreshadowed.

Coal

The Ministry of Fuel and Power reports the output of coal for the week ended November 3 as 4,543,200 tons, as compared with 4,534,000 tons in the previous week. Distributed stocks for the week ended October 27 were 16,807,000 (16,707,000). The number of men on colliery books for the week ended October 27 was 694,200 (same).

NOVEMBER 8 PRICES

COPPER

Electrolytic...	£227	0	0	d/d
-----------------	-----	-----	-----	------	---	---	-----

TIN

(See our London Metal Exchange report for Thursday's prices)

LEAD

Soft foreign, duty paid	...	...	...	£175	0	0	d/d
Soft empire, including secondary lead	...	...	...	£175	0	0	d/d
English lead	...	...	...	£176	10	0	d/d

ZINC

G.O.B. spelter, foreign, duty paid	...	...	...	£190	0	0	d/d
G.O.B. spelter, domestic	...	...	...	£190	0	0	d/d
Electrolytic and refined zinc	...	...	...	£194	0	0	d/d

ANTIMONY

English (99%) delivered,	...	...	...	£390	per	ton
10 cwt. and over	...	...	...	£305	per	ton
Crude (70%)	...	...	...	£305	per	ton

NICKEL

99.5% (home trade)...	£454	per	ton
-----------------------	-----	-----	-----	------	-----	-----

OTHER METALS

Aluminium, £124 per ton.	Platinum (scrap), £33.
Bismuth, 28s. lb.	Platinum, £27/33 5s. nom.
Cadmium, 18s. 9d. lb.	Rhodium, £45 oz.
Chromium, 6s. 3d. lb.	Ruthenium, £30 oz.
Cobalt, 17s. 6d. lb.	Quicksilver, £73 10s./£74
Gold, 248s. f.o.z.	ex-warehouse.
Iridium, £65 oz. nom.	Selenium, 25s. nom. per lb.
Magnesium, 1s. 6d. - 2s. lb.	Silver (bar), 77d. f.o.z. spot
according to quantity.	and forward.
Osmiridium, £35 oz. nom.	Tellurium, 19s. lb.
Osmium, £70 oz. nom.	
Palladium, £8 10s. oz.	

ORES, ALLOYS, ETC.

Bismuth	...	...	30% 12s. 9d. lb. c.i.f.
	...	...	20% 10s. 3d. lb. c.i.f.
Chrome Ore—			
Rhodesian Metallurgical (lumpy)	£13	per	ton c.i.f.
" " (concentrates)	£13	per	ton c.i.f.
" " Refractory	£12	12s.	per ton c.i.f.
Baluchistan Metallurgical	£13	18s. 6d.	per ton c.i.f.
Magnetite, ground calcined	£26	- £27	d/d
Magnetite, Raw	£10	- £11	d/d
Manganese, Best Indian	(Nominal)		
Molybdenite (85% basis)	103s.	14d.	per unit c.i.f.
Wolfram (65%), U.K.	525s.	nom.	c.i.f.
Tungsten Metal Powder	35s.	nom.	per lb. (home)
(for steel manufacture)			
Ferro-tungsten	33s.	nom.	per lb. (home)
Carbide, 4-cwt. lots	£40	3s. 9d.	d/d per ton
Ferro-manganese, home	£40	12s. 8d.	per ton
Ferro-manganese, export	...	...	...
Brass Wire	2s.	7 1/2d.	per lb. basis.
Brass Tubes, solid drawn	2s.	1d.	per lb. basis.

Portuguese India's Mineral Exports, January-June, 1951.—

Exports of high-grade iron ore from Portuguese India during the first half of this year rose sharply to 61,123 tons from an average of 35,494 tons in the corresponding period of last year and 5,379 tons in the whole of 1948. Exports of manganese ores during the first half of this year totalled 8,200 tons, compared with an average of 10,507 tons in the same period of 1950 and 4,728 tons in the whole of 1948. Iron ore shipments went mainly to Japan, West Germany and Holland and exports of manganese ore went mainly to the U.S., Belgium, Sweden and Italy.

Spanish Metal and Mineral Production, Jan.-July.—The Spanish Economic News Service reports the tonnage of minerals and metals produced in the Republic for the first seven months of the current year as follows, the figures for the corresponding seven months of last year are given in brackets:

Minerals: Sulphur, 25,154 (33,988); tin (March omitted) 739 (544); phosphorite, 12,754 (14,018); manganese, 11,965 (10,006); wolfram (March omitted), 701 (397); antimony, 350 (762); copper, 144,944 (107,010); pyrites, 935,592 (705,631); lead, 41,322 (25,953); potassium salts, 640,659 (575,444); bismuth, 38 (38); magnetite, 2,130 (1,251); fluor-spar, 30,673 (19,981); iron ore, 1,795,353 (1,677,250).

Metals: Electrolytic copper, 5,013 (Jan.-May); blister, 3,753 (3,384); cement copper (May wanting), 1,740 (2,217); tin, 730 (469); aluminium (6 months), 1,744 (1,326).

Mining Men and Matters

Mr. G. R. Fisher, general manager of operations and a director of The Zinc Corporation, and also a director of New Broken Hill Consolidated, is to become vice-chairman of Mount Isa Mines on January 1, 1952. His resignation from his present position with The Zinc Corporation Group will become effective as from that date.

Sir John Huggins has been elected a director of Trinidad Petroleum Development in place of Sir Claud Hollis, who has retired.

Mr. F. N. Keith has been appointed a director of Lyndhurst Deep-Level (Gold and Silver).

Mr. Thomas Kenny has been appointed a director of Hampton Gold Mining Areas in place of Mr. C. A. J. Sanders, resigned.

The Rt. Hon. Lord Leathers has resigned from the board of Union Corporation owing to his Government appointment.

Inter-American Mineral Resources Conference.—The Inter-American Conference on mineral resources opened in Mexico on October 29. The primary purpose of the 1,500 experts who are attending the conference is to draft a geological survey of the entire Western Hemisphere to estimate the total mineral resources available.

The Institution of Mining and Metallurgy as previously announced have published separately, for the first time, *I.M.M. Abstracts* covering the period October-November, 1951. This is a survey of world literature on economic geology, mining, mineral dressing, extraction metallurgy and allied subjects. In its new form *I.M.M. Abstracts* will be published every two months at 5s. per copy or 30s. per annum.

Business Items

Mr. F. C. Chisnell has been appointed managing director of the Anglo Metal Co. in succession to Mr. C. Sussmann who has resigned his position as joint managing director and member of the board.

Mr. E. H. Discombe has retired from his position of delegate director and commercial manager of Murex Welding Processes.

The Rt. Hon. The Earl of Gowrie has been appointed an extraordinary director of the Australia & New Zealand Bank.

Mr. R. F. Medlicott has been appointed a member of the South African Board of Barclay's Bank (D.C. and O.).

Sir James Moir Mackenzie, deputy director-general of the Federation of British Industries, has retired after 30 years' service.

Mr. David L. Pollock has been appointed a director of Westminster Bank.

Mr. E. J. Wilson, until recently the assistant engineer to the Port of London Authority, has been appointed London office manager of Richard Sutcliffe, Ltd. at 235, Vauxhall Bridge Road, London, S.W.1. Telephone: Victoria 0844.

Londex Ltd., electrical remote control engineers and manufacturers, have announced that in addition to their factories at Annerley and Penge, they have acquired a third factory in Croydon. The main offices and research section remain, however, at the Annerley works, telephone: Sydenham 6258; and the progress (delivery enquiries) and buying departments, at the Penge works, telephone: Sydenham 2431.

The Gauge & Toolmakers' Association have announced that for the session 1951/1952 the officers of the Association will be: Mr. F. W. Halliwell (chairman and managing director of Gay's (Hampton) Ltd.), president; Mr. H. S. Holden (managing director of the Brooke Tool Manufacturing Co. Ltd.), chairman; Mr. A. L. Dennison (chairman of the Birmingham Tool & Gauge Co. Ltd.) and Mr. L. E. Van Moppes (director of L. M. Van Moppes & Sons (Diamond Tools) Ltd.), vice-chairmen; and Mr. R. Kirchner (director of Arnott & Harrison Ltd.), honorary treasurer.

British Timken have announced that, following the order received by the North British Locomotive Co. from the South African Railways & Harbour Administration for 60 steam locomotives of a four-eight-four type (see *The Mining Journal*, September 21, p. 290), their associate company, British Timken S.A. (Pty.), Ltd., have received a contract, from the same authorities, to equip these locomotives completely with Timken tapered roller bearings. This equipment, which will be manufactured at the Aston, Birmingham, works of British Timken, will comprise Timken tapered roller bearings cannonboxes for leading bogie and all coupled wheel axles, tapered roller bearing axleboxes for the trailing bogie, and tapered roller bearing crankpin equipment. A South African representative of the North British Locomotive Co. has just announced that work is to begin almost immediately on the first of 60 more locomotives mentioned above.

The Mining Markets

(By Our Stock Exchange Correspondent)

The past week began with continued heavy falls in prices. On Monday a noticeable change in sentiment took place and the fall was checked. Since then a seesaw motion has developed with the volume of business declining as the date for the new Chancellor's statement approached. At the time of writing it is too early to assess fully the significance of his proposals for cutting expenditure. Indeed, it is emphasized that these are only of a temporary nature, and a full investigation will be made before next April's budget. At the moment all that can be said is that the measures are drastic and unpleasant although patently necessary in view of the critical state of the nation's finances. Of especial interest to the Stock Exchange, will be the decision to raise the bank rate from 2 per cent to $2\frac{1}{2}$ per cent. It will be interesting to see how much this change has been discounted by recent falls in short dated Government Securities. Now that it has been established that the Chancellor is prepared to use monetary weapons against inflation, the bank rate indicator will be watched every Thursday in the House with more interest than for many years past.

The general trend reported above was copied in almost all mining sections. Kaffirs, with few exceptions, recorded declines. Here as elsewhere pre-election speculators have been forced to close their commitments on an unwilling market. The resultant setback in prices was echoed in Johannesburg where offerings from London met with few buyers. Nevertheless a few bargain hunters had appeared by Wednesday and some of the more popular issues recovered lost ground. The October Rand returns while mostly showing higher tonnages, nearly all indicated increased working costs. Thus the check to the rise which occurred recently has been short-lived. It was announced,

however, that the costs of both Johnnies and Anglo American Groups included retrospective increases in officials' salaries between July 1st and September 30th. Western Reefs alone reported a record tonnage milled at 108,500 tons against 107,000 in September.

Among O.F.S. issues some of the leading shares encountered selling. A large scale revival of public interest in this section appears unlikely until results more in keeping with some of the earlier borehole figures are announced. In market circles the President Steyn and Freddie South intersections were considered rather disappointing, and the Western Holdings figures satisfactory but not exciting.

West African issues eased following market sentiment. The announcement that Treasury permission had been obtained for the free marketing of 40 per cent of gold output failed to affect prices. Ashanti Goldfields figures for October reveal a fall in profits of some £26,000. This was caused by the short strike of native labour reported last week. These figures do not include any retrospective profit from October premium sales.

Although copper shares have fallen, there is an acute and world wide shortage of the metal. Market circles consider this decline to be somewhat illogical, since consumption of the metal persists at a high level and a reduction in the metal price due to deflationary influences appears improbable. Another bull point is that civilian consumption offers manifold uses for the metal should rearmament programmes be reduced.

The recovery in Wall Street after the recent setback steadied dollar issues in London. International Nickels attracted considerable attention. This prosperous concern which has been mentioned in this column from time to time has declared a quarterly dividend of 50c. plus an extra payment of 80c., making a total of \$2.60 for the year. This compares with 40c. per quarter plus an extra payment of 40c. (\$2.00 in all) last year.

[illegible]

Company News & Views

Free Gold Sales in Canada and West Africa

Mr. Abbott, the Canadian Minister of Finance, when explaining the regulations governing the sales of gold in the free market, revealed that relatively few Canadian gold producers intended to take advantage of the recent offer. This was not wholly unexpected, as those producers who elect to do so forgo assistance under the Emergency Gold Mining Assistance Act which was introduced in 1948 to assist the Canadian high cost marginal producers. The maximum subsidy a marginal producer can obtain in the current year is \$11 an ounce which taken together with the official Canadian mint buying price of approximately \$37 per oz., would yield a steady price of about \$48. Thus with the fairly assured premium of around \$13 per oz. above the official gold price, Canadian gold producers are not too keen to forgo this assistance and unload their output in a free market which during the present year has fluctuated from as high as \$U.S.55 per f.oz. to as low as \$U.S.40. However, it is thought a number of low-cost producers who are not receiving much in the way of Federal aid will take advantage of the new scheme.

The Gold Coast Government has now given its permission for the colony's gold producers to sell up to 40 per cent of their output on the free market. It is not yet clear, however, how these sales will be effected. Some are of the opinion that the premium sales will be undertaken collectively by the industry through the Gold Coast Chamber of Mines—a procedure similar to that adopted by South Africa and Southern Rhodesia. But there are others who feel that it will be the concern of the individual companies to make their own arrangements for disposing of the permitted percentage of their gold output on the free market.

The former scheme seems the more likely as premium gold sales effected through the Gold Coast Chamber of Mines would do away with the obvious difficulties which would arise if each mine was left to negotiate its own premium sales.

Self Help for Nanwa

As a result of the meeting of noteholders of Nanwa Gold Mines, referred to in *The Mining Journal* of September 21, page 293, noteholders have now sanctioned the issue of a further £50,000 5 per cent Secured Notes, and have also agreed to the sale, if necessary, of surplus plant and machinery up to a sum of £50,000. Following this step, an extraordinary meeting of shareholders was held on October 30, at which was authorized an increase in capital from £850,000 to £900,000 by the creation of 1,000,000 1s. shares to meet the exercising of share option rights attaching to the new note issue.

This meeting also provided shareholders with their first opportunity of meeting and confirming the appointment of the chairman and members of the new board who have been in charge of the company's affairs for the past month. The chairman, Mr. T. O. Farnworth, recently back from a visit to the mine, was able to give an encouraging report on the supply of native labour. He attributed former labour shortage to the natives' reluctance to come to a mine which they believed was shortly to close down. Now that they had been reassured on this point they had all the underground labour they required, and were even able to pick and choose their men. At the same time, they were economizing in surface labour. Similarly, now that the position had been explained to the European workers they were keen and enthusiastic.

There is now a consulting metallurgist at the mine, and recovery in September increased to 924 oz. compared with

556 oz. for August, with an increase of only 50 tons throughput at the mill. A portion of this increase is, however, due to recovery from flue dust, which strictly speaking, belongs to the July and August production. Production for the first half of October, including a mid-month clean-up, yielded a further 481 oz., pointing to a sustained improvement.

Development underground is now on a more orderly basis and the chairman expects that the operation of the mine will reach a break even point much sooner than had previously been thought possible.

Referring to a large outcrop of oxidized ore lying between the mine and Virginia, 1½ miles away, the chairman considers on the basis of the values so far disclosed that the surface prospecting of the whole reef would be justified, and might lead to the working of the surface deposits by opencast methods. It has been tentatively estimated that, if after prospecting, this new development were to appear justified, the cost of machinery for opencast working and for extensions to the mill would be around £100,000.

The present target for underground production is 6,000 tons a month. If the surface deposits prove workable the possibility would then arise of being able to earn enough current revenue from surface mining to suspend underground production altogether, while development was carried out to permit of an eventually much larger mine production.

Meanwhile, the immediate problem of financing the next few months has still to be faced. Although the company's creditors are giving the company every chance to re-establish itself, the board has been unsuccessful in securing any further outside financial assistance. Consequently, the future of the company depends entirely upon existing shareholders themselves taking up the further note issue. The chairman has stated that these notes, in common with those already issued, are well secured by the company's assets, and that if this money is found it should in the new circumstances not be necessary to dispose of any of the plant and machinery which would be required to raise underground production to 12,000 tons per month. Given that this is so, it may well appear to many shareholders that they have everything to gain and nothing to lose by coming to the company's rescue.

Company Shorts

Ipoth Tin Dredging.—This company has recommended a final dividend for the year ended March 31 of 1s. 9d. per 16s. stock unit. Net profit for the year expanded to £136,872 compared with £93,843.

Temoh Tin Dredging.—This company has recommended a dividend of 12½ per cent (10 per cent) per stock unit for the year ended June 30, 1951. Net profit for the year improved to £47,405 compared with £28,646 previously.

Kramat Pulai.—Profit for the year to March 31, 1951, of Kramat Pulai, after all charges including £13,705 (£12,305) for taxation, amounted to £10,422 against £9,785 previously. The company is maintaining its dividend distribution at 6d. per share. The annual meeting will be held on December 18.

Ampat Tin War Damage Award.—Ampat Tin Dredging has announced that it has been notified by the War Damage Commission in Malaya that the assessed award for the company's claim for restoration and compensation is in the sum of £193,299. It is expected that a first interim payment of 60 per cent (£115,980) will shortly be made and set off against the government rehabilitation loan of £159,970. Certain consequential tax liabilities may arise which cannot, as yet, be calculated.

Triton Gold Mines.—The London secretaries of the Triton Gold Mines N.L. have announced that according to a cable from Melbourne, the registers will be closed permanently as from 5 p.m. on Wednesday, November 21 to determine mem-

bers entitled to a second and final distribution of 5.4d.A. per share payable on and after December 21.

An interim distribution of 9d.A. per share was made on July 15.

Kamunting Pays a Final of 15 Per Cent.—As previously announced in our issue of October 5, the directors of Kamunting Tin had deferred consideration of a final dividend until the position with regard to the White Paper proposals on dividend limitation were clearer. They have, therefore, now decided to recommend a final dividend of 15 per cent which, together with the two interim dividends already paid, make 40 per cent for the year against 25 per cent previously.

Beralit Tin and Wolfram has announced that it has concluded arrangements with the Ministry of Materials for the sale of a substantial proportion of its output for the next two years, one half at a fixed price and one half at the market price prevailing from time to time. The effect of this contract, taken in conjunction with that made in May with the United States authorities, is that approximately 50 per cent of the company's estimated production has now been contracted for at fixed prices until the middle of 1953.

Siamese Tin Syndicate's Special Interim.—A special interim dividend of 50 per cent has now been declared by Siamese Tin Syndicate. This relates to the dividend the directors had intended to pay as a final distribution for the year 1950 but were prevented from doing so by the White Paper proposals on dividend limitation. In addition a second interim dividend of 50 per cent in respect of 1951 has also been declared making 100 per cent payable on December 1 to all those registered on the company's books on November 7.

Kamra Tin Passes Dividend.—Kamra Tin Dredging, the Siamese tin producer, for the year to March 31, showed a dredging profit, after charging £39,000 (£14,000) for major dredge replacements and repairs, of £9,493 against £4,748. But after charging expenses depreciation, etc., the profit figure of £4,130 compared with £16 previously. It is also stated in the preliminary announcement that taxation on the current profits amounted to £12,282 against only £538 previously.

Bangrin Tin's Special Interim.—The same circumstances which prevented Siamese Tin from paying its intended final dividend, details of which were given in our issue of October 19, also affected the daughter company Bangrin Tin Dredging. Thus it has now declared a special interim dividend of 10 per cent. Additionally it has also declared a second interim dividend of 20 per cent in respect of 1951 making 50 per cent payable on November 24 to all those registered on the company's books on November 7.

Jantar Nigeria Strengthens its Reserve.—Profit for the year ended September 30, 1951 of Jantar Nigeria after all charges including £99,652 (£36,050) for U.K. and Nigeria income tax amounted to £72,457, a big jump on the previous year's earnings of £26,977. The sum of £45,000 against £10,000 was allocated to general reserve and the dividend payment was stepped up to 35 per cent (20 per cent) which absorbed £24,806.

The report and accounts will be sent to stockholders on November 28 and the annual meeting will be held on December 21.

Zaaiplaats Earns and Pays More.—Zaaiplaats Tin Mining Company, the Transvaal tin producer for the year to July 31, paid 75 per cent compared with 30 per cent previously. The bigger distribution reflects the larger gross revenue which rose to £1,783,567 compared with £857,743 and the higher net profit figure of £104,505 against £46,090 which was struck after meeting much heavier costs and taxes. From the £150,044 (£82,357) available the dividends required £48,511, the sum of £8,348 was allocated to reserve and £15,407 was expended on fixed assets leaving £150,044 (£45,539) to be carried forward.

Anglo-Ecuadorian's Higher Net Profit.—A preliminary announcement giving the results for the year to March 31, of Anglo-Ecuadorian Oilfields show that net profit, after all charges including £234,639 (£99,719) for taxation, was £235,731 against £169,078. The distribution is being raised to 10 per cent on the £1,500,000 capital which compares with 7½ per cent paid last year. Profit on investment realized amounted to £16,905 (£1,620), the sum of £93,440 (£10,000) was written off subsidiaries' shares and advances and £352,407 (£323,431) was written off depreciation and development expenditure.

Lord Forbes is chairman. The annual meeting will be held on December 4.

New Broken Hill September Output.—In our issue of November 2 under "September Miscellaneous Mine Returns," the monthly figure of New Broken Hill was unfortunately omitted. During the period August 19-September 15, New

Broken Hill treated 19,004 tons ore assaying 9.6 per cent lead, 12 per cent zinc and 2.4 oz. silver, yielding 2,251 tons lead concentrates and 4,063 tons zinc concentrates. These figures were erroneously attributed to Broken Hill South, whose output for the four weeks ended October 6 was 22,340 tons ore, assaying 72.4 per cent lead, 52.2 per cent zinc and 40.3 oz. silver yielding 3,717 tons lead concentrates and 4,588 tons zinc concentrates.

Wanderer Consolidated to be Wound Up.—Net profit of Wanderer Consolidated Gold Mines, the Southern Rhodesia gold producer, for the year to June 30, was £3,878 (£2,628) which figure was augmented by £122,481 brought in, £3,996 taxation provision written back, £718 profit on sale of fixed assets and £1,151 in respect of an insurance rebate making £132,224 (£147,996) available. After meeting all appropriations the carry forward was £126,441 against £122,481. The latest balance sheet shows current assets of £87,114 and current liabilities of £43,072.

As previously announced the company, in view of its slender ore reserves, continued rise in working costs and shortage of labour, had decided to cease mining operations. In the report and accounts now published the directors state that the end of profitable mining operations are in sight and that a resolution to wind up the company will be proposed at the annual meeting to be held on November 27.

Cementation to Make "Rights" Issue.—A preliminary announcement of the results of the Cementation Company for the year to March 31, 1951 shows that the net trading profit of the group amounted to £424,041 (£396,480) but that after deducting taxation and charges of £219,200 (£167,504), and £116 (£582) attributable to outside shareholders net profit was reduced to £204,725 compared with £228,394.

From the group profit available of £307,587 (£325,024) the sum of £1,326 was deducted, being profits of a subsidiary capitalized by the issue of preference shares and £152,851 (£69,205) was carried forward in the accounts of subsidiaries leaving Cementation with an available balance of £153,410 (£180,819).

The dividend payment of 15 per cent on £650,000 issued capital (15 per cent on £500,000) required £51,188, general reserve received £25,000 (£75,000), an amount of £17,000 (£14,000) was transferred to taxation equalization reserve and after meeting payments on the 6½ per cent First Preference Stock and on the 4½ per cent Second Preference Stock, the balance remaining to be carried forward was £43,380 which compares with £35,657 previously.

The company has also announced that it will make a "rights" issue of ordinary shares to stockholders of 6,500,000 ordinary shares of 1s. each at 1s. 9d. in the ratio of one new share for every two held on November 12 to all ordinary stockholders registered before November 6. Preference and ordinary stockholders on the registers on the said date, November 5, will be allowed to apply on the same terms for

Trepca's Investigation into its Former Yugoslav Properties.—The Foreign Compensation Commission, which was set up in August, 1950, to deal with claims to Yugoslav compensation for all British interests affected by Yugoslav nationalization has started to examine evidence, and a mining expert appointed by the Commission, has recently conducted an investigation into the technical aspects of the Company's claim in respect of its former properties in Yugoslavia, state the directors of Trepca Mines in their preliminary statement for the year ended September 30, 1951. In view, however, of the large number of claims to be considered by the Commission, it seems likely to be some time before its awards are made known.

The directors also point out that of the £4,500,000 agreed by the Yugoslav Government to be paid as compensation for all British interests affected by Yugoslav nationalization measures, £1,209,000 (nearly 27 per cent) has been received by His Majesty's Government. A further £253,000 is due on 22nd December, 1951, and the balance of £3,038,000 is payable in half-yearly instalments up to December, 1957.

Net profit for the year to September 30, was £10,032 (£12,357). From the £268,740 (£283,708) available, investment reserve was allocated £25,000 (£20,000) and exploration reserve £5,000 (same) leaving £238,740 (£258,708) to be carried forward.

Depreciation in the value of the company's investments amounting to £30,015 (£10,786) was charged to investment reserve and the expenditure incurred during the year on exploration of £5,467 (£2,107) was charged to exploration reserve.

The report and accounts will be posted to stockholders on November 22 and the annual meeting will be held on December 18. Mr. A. Chester Beatty, Jr., is chairman.

Topical News in Brief

Australia Prohibits Exports of Diamonds.—Diamonds are included in the latest gazetted list of Australian prohibited exports to meet a request from the South African Government. Exports of zinc and zinc alloys and bauxite have also been banned.

A Second Steel Plant for South Africa.—The Union Government is seriously considering the establishment of a second I.S.C.O.R. works to provide the entire steel requirements of the Union. Mr. Louw, Minister of Economic Affairs, stated at a recent meeting.

E.C.A. Technical Assistance for Ruhr Mines.—U.S. experts will advise West German mining engineers on ways of increasing Ruhr coal production, states an announcement by the West German Economics Ministry. These technicians will be sent by the Economic Co-operation Administration.

New Coal Deposits Discovered in Serbia.—Further large brown coal deposits have been discovered in the Senj-Rosava basin, Serbia, Yugoslavia. In places, the seams have a thickness of up to 40 metres. Work on the newly discovered deposits has already started, and it is hoped that a substantial increase in production from this area will take place next year.

First Oil Discovered in British Columbia.—Pacific Petroleum (an affiliate of Canadian Atlantic Oil Co.), has just announced that oil—the search for which had been going on for 30 years—has been struck near Fort St. John, in Northern British Columbia. Dr. T. B. Williams, Petroleum and Natural Gas Controller for the Province, commented at Victoria: "It is a very big announcement. The ultimate possibilities are tremendous."

Far Eastern Inland Water Transport Inspect British Coal Transport System.—Twelve experts on inland water transport from five Far Eastern countries, who are on a three-months tour of Europe and North America, have just completed a visit to Great Britain, which included the Port of Goole where they inspected "compartment boats" which serve to transport coal from the collieries to the Port area. It was generally agreed that great credit was due to the 21-year-old engineer who in 1890 had designed these boats, the modern equivalent of which had been shown in Germany as a new and quite revolutionary invention. Moreover, it was noted that the design of the compartment boats had hardly been altered since 1890.

New West German Steel Companies.—Three new independent steel companies have been set up in Western Germany under a High Commission order aimed at breaking up steel cartels. The three companies are: one to be formed by a merger between the Westdeutsche Mannesmann Roehrenwerke and the Huettenerwerke Hucking—both detached from the Mannesmann Roehrenwerke Company; the Deutsche Edelmetallwerke—detached from the Vereinigte Stahlwerke; and the Huettenerwerk Rheinhausen—detached from the Krupp concern. This action brings the number of independent companies set up to 13 out of the total of 24 agreed upon.

English Electric & Metrovick Obtain £1,000,000 Order.—The English Electric Export & Trading Co. and Metropolitan Vickers Electrical Export Co. have announced that they have negotiated a £1,000,000 contract for the hydraulic, mechanical and electrical equipment for a new power station to be built by the Hydro-Electric Co. of Zezere at Cabril on the Zezere River.

The new power station will be equipped with two hydro-turbine units of 73,000 maximum h.p. each with ancillary switchgear and transformer equipment, all of which will be manufactured in the U.K. This contract, it is stated, was obtained in the face of severe foreign competition.

N.C.B. Orders for Pneumatic Equipment.—Three motor-driven air compressors, with a stand-by fourth, will supply each of the two extensive pneumatic schemes, to be carried out at Plesley and Sutton Collieries for East Midlands No. 4 Area, by the Westinghouse Brake & Signal Co., Ltd. The equipment will include rams, skotch-blocks, control and in-line valves for decking; automatic gates, keep operating and axle catch release gear. Air-locks for fulls and empties, and tippler loading plant will also be provided. Plesley will be equipped with pneumatic control of points between the air-lock and main cages and of those leading to the tippler; while Sutton will have point control only between the airlock and main cages.

In Areas No. 2 and 6 of the South-Western Division, automatic gates have been ordered for pit-bottom and mid-landing at Faldau and, at Waunlydy, a repeat order of decking plant and axle catch release gear is to be installed.

New Austrian Billet Mill Nearing Completion.—The new billet mill of the heavy plate mill at present under construction at the Donawitz rolling plant is likely to go into production in about two months' time. Output will be about 40,000 tons annually.

Wolframite Deposits Discovered in Turkey.—Large deposits of wolframite have been discovered at Uludag (Mount Olympus) in Bursa, Turkey, by the Turkish Mineral Research Administration. Although the construction of a plant to process wolframite is a long-term project, its immediate export, as unprocessed or semi-processed ore, is expected to add appreciably to Turkey's foreign exchange.

U.S. Search for Scarce Materials.—The United States intend to range over the entire "free world" in its search for minerals and other scarce materials. Mr. Larson, head of the Defence Materials Procurement Agency, is reported to have said: "A substantial part of our materials interests lies abroad and only by developing them can we continue to expand our free society." He also said that the U.S. must now plan in terms of years or even decades and tap foreign sources of the scarce materials in such a way that the flow would not again be interrupted.

Boliden Company's Expansion Programme.—The Boliden Co. is at present carrying out an ambitious reconstruction and rationalization programme at its copper works at Roenskaer, North Sweden. New installations are being constructed for the anode and cathode furnaces, so that the plant will then have what is described as the biggest electric-arc furnace in the world, despite the fact that the smelting house is not very large. Total expenditure envisaged under the programme is 6,000,000 crowns. The new installations are expected to be completed within 18 months, but the anode plant will be ready by the beginning of next summer. The number of workers at present employed in the Roenskaer works is 1,300.

International Bank Delegation Visiting S. Rhodesia.—A delegation from the International Bank for Reconstruction and Development arrived in Salisbury on October 22 to study the possibilities of a loan to Southern Rhodesia and to hold consultations with the Government and with private banks in the Colony. "Although I cannot at this stage say whether a loan will definitely be made," said Mr. Cope, the head of the delegation, when interviewed. "I hope that, as with many other countries we have visited, a loan will be the culmination of our visit. Besides discussing the matter from a purely economic point of view, we intend to travel about the country and see what schemes Rhodesia has undertaken for herself. We shall, in the course of our travels, visit the coal mines at Wankie and also the Sabi Valley."

New Zealand Open-cast Coal Sufficient to Keep Her Industries Running.—A striking fact which has emerged from the recent strike of underground miners in New Zealand is that this Dominion's opencast coal resources have been proved to be far greater than was generally believed, particularly in the North Island, and are sufficient to keep the country's industries running, though on a reduced scale, without coal from underground workings.

Coal in the Waikato field south of Auckland, North Island is estimated to contain at least 6,000,000 tons and one deposit alone, as yet untouched, is estimated to contain 4,000,000 tons of coal equal in quality to Waikato underground coal. It is considered that these fields could, if necessary, by opencast methods maintain their present output of New Zealand's opencast and underground workings combined. During the strike the State, which owns most of the country's opencast mines, increased production by 50 per cent in a few weeks.

In 1950 Waikato opencast miners produced six times more coal per man than underground miners. While 1,508 men underground averaged only 366 tons per man during the year, 118 opencast miners produced an average of 2,147 tons each. Total output from all New Zealand mines last year amounted to 2,813,275 tons, while opencast produced a record of 741,987 tons.

One of the chief reasons for the superiority of productivity in the opencast mines is their far greater adaptability for mechanization as the underground mines do not lend themselves to the same degree of mechanization found in other countries. Coal is hewn mechanically or by hand and hand-loaded into tubs, which are dragged to the main gallery, whence it was taken out by trucks. Huge pillars of coal are left for safety and 30 to 40 per cent of the seam is left untouched.

However, there is no likelihood of the underground mines being abandoned, the Reuter report adds, as they would be needed when surface deposits ran out and the trained miners who worked them would also be indispensable.

SIAMESE TIN SYNDICATE

The Forty-Fourth Annual General Meeting of the Siamese Tin Syndicate, Ltd., was held at Winchester House, London, E.C.2, on November 8th.

Mr. Kenneth O. Hunter (Chairman) presided.

The following is an extract from the Chairman's Statement which was circulated with the report and accounts.

Output of tin ore rose from 1,445 long tons in 1949 to 1,525 tons in 1950. This was mainly due to the fact that our three dredges on the Ngow property were operating throughout the year whereas in 1949 Ngow No. 2 dredge operated for 10½ months and No. 3 for 6½ months only. Increased output naturally involved increased mining expenditure but having regard to the higher costs of labour and materials the increase cannot be regarded as excessive. You may observe that the charge for amortisation of Mining Properties in 1950 was only £4,179 as against £7,313 in the previous year.

The reason for this apparent anomaly lies in the fact that it proved profitable to work certain low grade areas previously considered uneconomical and to re-work some ground the expenditure on which had already been fully amortised.

The average content of tin ore per cubic yard fell from 0.43 lb. in 1949 to 0.40 lb. in 1950, but of course the increase in output and the high average price of tin metal in 1950 more than compensated for this small reduction.

The proceeds of ore sales, less selling charges, amounted to £948,003—equivalent to £622 per ton of ore—as compared with £585,817 and £405 per ton in 1949. This has enabled us to show a mining profit of £371,027 for the year 1950, which is a record for the Company and is arrived at after deducting a mining loss of our Malayan subsidiary amounting to £5,969.

Members will observe that Export Duty—Siamese and Malayan—amounted to almost £150,000, or nearly 16 per cent. of our net ore proceeds.

In my statement to the Members on the accounts for the year 1949 I gave our estimates of the future life of the properties which are at present being mined. Such estimates were based upon the speed at which the deposits are being mined, the prospective price obtainable for our product and the economic operation of the lower grade areas. We have approximately 165,000,000 cubic yards of ground at our various properties. Of this some 68,000,000 are either not workable at the moment or would be so if the price of tin fell much below £800 per ton.

The Consolidated Net Profit for the year 1950, before providing for taxation, is £350,232 and consists of the Parent Company's earnings of £358,686 from which is deducted the provision for the loss of £8,454 incurred by our subsidiary, Siamese Tin Syndicate (Malaya), Ltd.

No provision for a final dividend has been made in this year's accounts, in view of the Chancellor of the Exchequer's statement of July 26.

I am pleased to report that in May, 1951, the Company received the amount of £378,707 in settlement of our Siamese General War Damage Claim.

Current Assets at the close of the year 1950 amounted to £943,123 while Current Liabilities, excluding the advances from the Siamese Government, which were repaid out of the War Damage Compensation received, amounted to £398,896. In addition Provisions for Upkeep of Dredges and for Pre-War Taxation total £109,645, leaving net current assets of £434,582. Against this, however, there is a deferred liability for taxation of £152,025 and in addition forward commitments for the purchase of plant, machinery, etc., require some £31,000.

You will wish to know something of what has happened since the closing of these accounts.

Mr. J. A.C. Bergne paid a visit to the East of 3½ months during the spring, and in that time examined our undertakings in detail, visiting every property and dredge, with the exception only of Gambang, which was forbidden to him.

The Kota Bahru dredge sank on March 15 and was raised on June 3. It was then docked for repairs. It is estimated that she will be ready for work before the end of the year. The 2½ months of work produced a mine working profit of £34,678 more than sufficient to pay off all losses up to the time the dredge sank.

A provisional award of £59,159 has been made by the Malayan War Damage Commission on the War Damage Claim of our Subsidiary Company. This award is subject to adjustment by the Commission and under the agreement made for the purchase of the Kota Bahru property one-half of the final compensation is payable to the vendors.

The search for new properties continues to be prosecuted actively. Negotiations have now been completed for an option to purchase mining and other rights at Leadhills and Wanlockhead, contiguous properties in Scotland. Options have also been taken up over certain areas of dredging ground in Siam, and these are being tested at the moment.

The report and accounts were adopted.

BANGRIN TIN DREDGING

The Thirty-First Annual General Meeting of the Bangrin Tin Dredging Co., Ltd., was held on November 8th, at Winchester House, Old Broad Street, E.C.2.

Mr. Kenneth O. Hunter (Chairman) presided.

The following is an extract from the Chairman's Statement which was circulated with the report and accounts.

The output of tin ore for the three dredges has shown the remarkable increase from 598 tons to 1,101 tons in 1950. To some extent this has been due to all three dredges and the powerhouse being in operation throughout the year, and to the complete absence of serious stoppages. But in the main it has been brought about by the No. 1 and No. 3 dredges achieving a higher recovery, and at the same time increasing considerably their throughput in cubic yards per working hour. Thus the total figure for ground treated was 43 per cent. higher than for 1949. The larger output naturally involved increased mining expenditure, but even after allowing for the higher cost of labour, fuel and stores, the working cost per cubic yard raised (before charging Export Duty, Depreciation or Amortisation) shows an increase of only a fraction of a penny per cubic yard, while the cost per ton of tin ore won was reduced from £317.16 to £302.8.

The proceeds of Ore Sales, less selling charges, amounted to £627,774, equivalent to £570 per ton of ore—as compared with £240,357 and £402 per ton in 1949. This has enabled us to show a Mining Profit of £294,377 for the year 1950. A comparative statement of statistics is attached. From this it will be seen that we paid no less than 19 per cent. of the net proceeds of our ore in Siamese Government Export Duty.

It is estimated that the future life of this property is 13 years of dredging with two dredges plus some small areas which might be workable by gravel pump or power shovel. But it must be realised that any estimate can be easily upset by a number of factors for which little allowance can be made, and must take into account the fact that with the increase in working costs certain areas might not prove profitable to dredge.

A profit of some £30,000 has been made on Exchange. Such items may be expected to fluctuate according to prevailing circumstances and the trend of operations. For 1950 the amount is much larger than we may expect on the average.

After the addition of the relevant income for the year and deducting the expenditure we are left with a net profit for the year 1950 of £319,008 before providing for Taxation.

Interim dividends totalling 40 per cent. less income tax at 9s. in the £ have been paid for 1950. But no provision for a final dividend has been made in this year's accounts, in view of the Chancellor of the Exchequer's statement of July 26.

After examining all possibilities we were faced first with the necessity of presenting accounts on time without awaiting the outcome of political manoeuvres; second, with the alternatives of ignoring a statement with no legal backing, or of acquiescing under strong protest. If we had acted upon the former, there was not only the possibility of penal retrospective legislation aimed at our Company, but our exceptionally strong case for exemption, or at worst favourable modification, might have been put in jeopardy. Accordingly, it was decided that the proper course was to put our views in a letter to the Chancellor of the Exchequer requesting complete exemption from the provisions of the contemplated legislation, or alternatively, to be permitted to pay a higher rate than would strictly be applicable in our case. A copy of that letter accompanies this statement and accounts.

In support of the alternative, we are bringing to the Chancellor's notice the fact that recommendations for a final dividend of 10 per cent. had actually been discussed at a Board Meeting on July 17 at which the auditors were represented, but that we agreed to postpone any final decision until a draft of our annual accounts incorporating that recommendation was submitted at the next Board Meeting. We regret that we cannot usefully make any further recommendations until the intentions of the Treasury are known.

I am pleased to report that in May, 1951, the Company received the amount of £143,722 in settlement of our Siamese War Damage Claim.

Mr. J. A.C. Bergne paid an extended visit to the East in the Spring, during the course of which he visited our property. Mr. Hubert Ashton was also able to spare a fortnight, and together they had important discussions in Bangkok, Penang, Kuala Lumpur and Singapore.

The search for new properties continues to be prosecuted actively. Early in the year an examination was made of a tungsten property in Uganda, but it was decided not to proceed further. Negotiations have now been completed for an option to purchase mining and other rights at Leadhills and Wanlockhead, contiguous properties in Scotland, about which you have already received details in a circular.

The report and accounts were adopted.

HARMONY GOLD MINING CO.

The First Annual General Meeting of Shareholders of Harmony Gold Mining Co., Ltd. was held in Johannesburg on November 2, 1951.

Mr. G. V. R. Richdale, Chairman, presided and in the course of his speech said:

During the eleven months from August, 1950, when sinking commenced, to June 30 last, the average footage sunk each month was 118 in No. 3 Shaft and 160 in the ventilation shaft. Much of this shaft sinking took place in extremely difficult ground and a large proportion of the total time was taken up in sealing the water fissures by cementation. Since June 30, 781 ft. have been sunk in No. 3 shaft and 875 ft. in the ventilation shaft, bringing the total depths at November 1 to 2,141 ft. and 2,704 ft. respectively. During this period the average footage sunk per month of 195 ft. for No. 3 Shaft and 219 ft. for the ventilation shaft shows an encouraging improvement on the figures I have just quoted for the earlier period. Both shafts have passed out of the heavily fissured water-bearing Ventersdorp upper sediments which necessitated prolonged cementation operations, but we must expect that progress will meet with further delays from time to time. No. 3 Shaft is in lava and has approximately 2,679 ft. to go to the Basal Reef horizon, while the ventilation shaft, which has passed through the lavas and is now sinking in the quartzites, is approximately 1,476 ft. from the reef.

On the basis of the current rate of sinking, it is possible that the ventilation shaft may reach the Basal Reef horizon about June, 1952 and No. 3 Shaft early in 1953. This being the case, it may be possible to commence milling at an initial rate of 40,000 tons a month towards the end of 1954. There are, however, many unknown factors for which allowance must be made when calculating these dates and you must understand that I give them with considerable reserve, merely as a general indication of what may be hoped for if conditions are favourable.

The Consulting Engineer's report contains details of the exploratory drilling programme carried out on your Company's property and in areas adjacent to it. Since that report was compiled, the results have been announced by New Consolidated Free State Exploration Co., Ltd. of three further boreholes—LR5, LR6 and LR7—on the Farm La Riviera No. 289, immediately to the north of the Harmony lease area. They are indicated on the map which accompanied the report and I wish to comment briefly on their implications as far as the Harmony mine is concerned. Owing to lack of drilling on these neighbouring farms and the absence of the Basal Reef in Borehole RU1 in the extreme north-eastern corner of the Harmony property, it was originally difficult to make any close assessment of the potentialities of this portion of the lease area. Indeed, the results of Boreholes LR3, which intersected the Basal Reef with low values, and of RU1 led our technical advisers to assume that the north-eastern limit of the Basal Reef on Harmony probably occurred somewhere between these two holes. Boreholes LR5, 6 and 7 however, all of which gave good values, indicate that the limit of the Basal Reef may be farther to the east than was originally assumed. The rich ore now proved to exist to the north of our boundary further strengthens the confidence held by your Board in the future success of the Harmony mine.

The Balance Sheet shows that at June 30, the loan accounts stood at £744,000 and accrued interest amounted to £8,843. A further amount of £438,000 has been borrowed since then, which brings the total borrowings to date to £1,182,000. The unexercised loan facilities therefore amount to £668,000, and it is estimated that this sum will be sufficient to meet expenditure until March next year when it will be necessary to obtain fresh funds to enable your Company to repay these loans and to finance the continued development of the property. Your Board has decided to raise these funds by means of a further issue of shares and, with this object, seeks your approval to increase the authorized capital by a nominal amount of £750,000 to £3,750,000 by the creation of 3,000,000 new shares of 5s. each. You will also be asked to authorize the Directors to offer to shareholders of the Company, at a price to be decided by the Board nearer the date of issue, as many shares up to a maximum of 6,800,000 as may be necessary to raise approximately £5,000,000. You will no doubt be interested to know that the official consent of the U.K. Treasury to the proposed issue of shares in the United Kingdom was received a few days ago.

The cost of opening up, developing and eventually bringing to production a large mine such as Harmony is very considerable.

There is good reason to hope that the Harmony mine will be one of the best in the Orange Free State goldfield and that the capital which must be raised to bring it to production will in due course pay well-deserved dividends.

The Report and Balance Sheet were adopted and special and ordinary resolutions were passed.

RHODESIAN ANGLO AMERICAN LTD.

DIVIDEND No. 30

COUPON No. 30

With reference to the notice of declaration of dividend advertised in the Press on October 22, 1951, the following information is published for the guidance of holders of Stock Warrants to Bearer.

The dividend on stock represented by stock warrants to bearer will be paid on or after December 20, 1951, upon surrender of Coupon No. 30 at Barclays Bank (Dominion, Colonial and Overseas), Circus Place, London Wall, London, E.C.2, where issuing forms may be obtained.

Coupons may also be presented for payment in French currency at Banque de l'Union Parisienne, 6 and 8, Boulevard Haussmann, Paris, 9e.

Coupons presented at Barclays Bank (Dominion, Colonial and Overseas) must be left four clear days for examination and may be presented any day (Saturday excepted) between the hours of 11 a.m. and 2 p.m.

United Kingdom Income Tax as indicated hereunder will be deducted from dividends payable in respect of stock warrant coupons presented for payment in London unless accompanied by Inland Revenue declarations. Where such deduction is made, the net amount of the dividend will be 3s. 8.357d. per 10s. unit of stock, viz.:

PART I

50 per cent of Dividend regarded as payable out of profits earned before January 1, 1951, and subject to United Kingdom Income Tax:

	Per 10s. Unit
s. d. s. d.	
50 per cent of amount declared	2 3
Equivalent to a gross amount of	4 3.429
Less: United Kingdom income tax at 9s. 6d. in the £	2 0.429
	<hr/> 2 3

PART II

50 per cent of Dividend regarded as payable out of profits earned on or after January 1, 1951:

	Per 10s. Unit
s. d. s. d.	
50 per cent of amount declared	2 3
Less: United Kingdom income tax at 5s. 10d. in £ on the corresponding gross amount of 2s. 9.061d.	9.643
	<hr/> 1 5.357
Net Amount	<hr/> 3 8.357

For and on behalf of

ANGLO AMERICAN CORPORATION
OF SOUTH AFRICA, LTD.

Registrars and Transfer Agents in England.

11, Old Jewry,
London, E.C.2.
November 2, 1951.

W. E. GROVES,
London Secretary.

Note.—As regards Part I of the Dividend, by reason of Double Taxation Relief, the net United Kingdom rate of tax by Rhodesian Anglo American, Ltd. on its profits up to December 31, 1950, is 4s. 4d. in the £. Under Section 52 of the Finance (No. 2) Act, 1945, tax is deductible from Part I of the Dividend at the full standard rate of 9s. 6d. in the £, but the rate at which any relief or repayment due may be allowed to a Stockholder is limited to the net United Kingdom rate.

As regards Part II of the Dividend, the London Paying Agents have been requested by the Commissioners of Inland Revenue to state:—

Under the provisions of Section 36 and the sixth schedule of the Finance Act, 1950, relating to "Unilateral Relief" from Double Taxation, Northern Rhodesian tax applicable to Part II of the Dividend is allowable as a credit against United Kingdom tax payable in respect of that part of the Dividend.

The deduction of the tax at the reduced rate of 5s. 10d. in the £ instead of at the standard rate of 9s. 6d. in the £ represents a provisional allowance of credit at the rate of 3s. 8d. in the £. The final rate of credit allowable to a particular Stockholder depends on his personal rate of tax: it may be less than 3s. 8d. in the £ as it must not exceed three-quarters of the personal rate. Revision of the credit involves a corresponding adjustment of the amount shown as the gross amount of Part II of the Dividend for United Kingdom tax purposes.

Tin Companies September Quarterlies

We give below the output figures for the September quarter for a number of tin companies, some of which do not publish monthly figures, and are therefore not included in our monthly mine return figures:

Anglo-Burma Tin.—20 tons ore.
 Ayer Hitam Tin Dredging.—491½ tons ore.
 Bangrin Tin Dredging Co.—315½ tons ore.
 Chenderiang Tin Dredging.—40 tons ore.
 Gopeng Consolidated.—193½ tons ore.
 Hongkong Tin.—73 tons ore.
 Idris Hydraulic Tin.—60½ tons ore.
 Ipoh Tin Dredging, Lahat Section (Tributors)—76½ tons ore.
 Puchong Section (Tributors)—61½ tons ore.
 (Tributors)—10 tons.
 Kent (F.M.S.) Tin Dredging.—138 tons ore.
 Kepong Dredging.—79½ tons ore.
 Killinghall Tin.—107 tons ore.
 Kinta Tin Mines.—85 tons ore.
 Lahat Mines.—30½ tons ore.
 Malayan Tin Dredging.—108½ tons ore.
 Pari Tin.—18½ tons ore.
 Pengkalen.—135½ tons ore.
 Petaling Tin.—592 tons ore.
 Puket Tin Dredging.—100½ tons ore.
 Rambutan.—18½ tons ore.
 Renong.—238½ tons ore.
 Selayang Tin.—56½ tons ore.
 Siamese Tin Syndicate.—416½ tons ore.
 Southern Malaya Tin Dredging.—834½ tons ore.
 Southern Tronoh Tin Dredging.—188½ tons ore.
 Sungei Besi.—282½ tons ore.
 Sungei Kinta Tin Dredging.—135 tons ore.
 (Tributors)—10 tons.
 Sungei Way Dredging.—58½ tons ore.
 Tanjong Tin Dredging.—323½ tons ore.
 Tekka.—23½ tons ore.
 Tekka-Taiping.—84½ tons ore.
 Temoh Tin Dredging (Tributors).—65½ tons.
 Tronoh Mines.—390½ tons ore.

MINING ENGINEER with ore dressing experience to act as Field Engineer. Salary not less than £1,400 per annum commensurate with qualifications and experience. Pension scheme. Apply by letter to Secretary, Cyanamid Products Ltd., Bush House, London, W.C.2.

MESSRS. BASSETT SMITH & CO., LTD., announce that they have formed an Associated Company in Canada under the name Bassett Smith (Canada) Ltd., with offices at Room 701, 1410, Stanley Street, Montreal. The management will be in the hands of two former members of the parent Company's London staff, Mr. E. Margoles and Mr. P. Brown.

BORING. Foreman Supervisor to take charge of Percussion Boring, Diamond Drilling and similar Boring work in the United Kingdom and Abroad. Applicants must be thoroughly conversant with all types of Percussion Boring and Diamond Drilling plant and their operation, and be willing to travel extensively in the United Kingdom. Vacancies also are available for trained Percussion Borers to take charge of Percussion Boring Rigs. Write, stating salary required to George Wimpey & Co. Ltd., Central Laboratory, Lancaster Road, Southall, Middlesex.

The World's Greatest Bookshop

FOYLES
 • FOR BOOKS •

Large dept. for Technical Books

New, secondhand and rare Books on every subject. Stock of over 3 million volumes
 Subscriptions taken for British, American & Continental magazines

We Buy Books, Coins, Stamps

119-125 CHARING CROSS RD., LONDON, W.C.2

Central 5680 (10 lines) * Open 9-6 including Saturdays

**ORES
 METALS
 FERRO-ALLOYS**

MANGANESE
 CHROME
 TUNGSTEN
 ANTIMONY
 TANTALITE
 COLUMBITE
 ZINC
 LEAD
 COPPER



Philipp Brothers, Inc.

70 PINE STREET • NEW YORK 5, N. Y.

Offices: AMSTERDAM • BUENOS AIRES • CALCUTTA • LA PAZ • MONTREAL • LIMA • TOKYO

Metal and Mineral Trades

THE BRITISH METAL CORPORATION LIMITED

HEAD OFFICE
PRINCES HOUSE, 93 GRESHAM STREET, LONDON, E.C.2
Tel. Monarch 8055

AND AT
17 SUMMER ROW, BIRMINGHAM
Tel. Central 6441
47 WIND STREET, SWANSEA
Tel. Swansea 3166

OVERSEAS ASSOCIATES

THE BRITISH METAL CORPORATION
(AUSTRALIA) PTY., LIMITED
SYDNEY, PERTH AND MELBOURNE

THE BRITISH METAL CORPORATION
(CANADA) LIMITED
MONTREAL

DREW, BROWN LIMITED
MONTREAL AND TORONTO

THE BRITISH METAL CORPORATION
(INDIA) LIMITED
CALCUTTA AND BOMBAY

THE BRITISH METAL CORPORATION
(PAKISTAN) LIMITED
KARACHI

THE BRITISH METAL CORPORATION
(SOUTH AFRICA) (PROPRIETARY) LTD.
JOHANNESBURG

C. TENNANT, BONE AND CO.,
OF NEW YORK,
NEW YORK

THE COMMERCIAL METAL COMPANY LTD

66 GRESHAM STREET, LONDON, E.C.2

ORES, METALS (Ferrous and Non-Ferrous), METAL ALLOYS, etc.

Telephone: MONARCH 0211 (8 lines)

(Members of the London Metal Exchange)

Cables COMETALCO LONDON

EVERITT & Co. Ltd.

Telegraph Address: Persistent, Liverpool

40 CHAPEL STREET
LIVERPOOL
Phone: 2995 Central

SPECIALITY:

MANGANESE PEROXIDE ORES

We are buyers of:

WOLFRAM, SCHEELITE, VANADIUM,
MOLYBDENITE, ILMENITE, RUTILE,
ZIRCONIUM and TANTALITE ORES

Suppliers of:

FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS

LEONARD COHEN LTD.

1 HAY HILL, LONDON, W.1

GOLD, SILVER and the PLATINUM METALS
ORES, CONCENTRATES and RESIDUES
METAL HARDENERS and NON FERROUS
ALLOYS

Telephone:
GROSVENOR 6284

Works:
PORTH, GLAM.

Telegrams:
CUPRIUM, LONDON

New York Representatives
EUROPEAN METAL CORPORATION, 424 Madison Avenue, New York 17

EASTERN SMELTING CO. LTD.

CAPITAL—AUTHORISED £500,000: £435,000 ISSUED

Head Office: ST. SWITHIN'S HOUSE, 11/12 ST. SWITHIN'S LANE, LONDON, E.C.4

Telephone: MANsion House 2164/7

Telegrams: TIMAMASA, PHONE LONDON

TIN SMELTERS

BRANCHES THROUGHOUT THE MALAY STATES

Sole Selling Agents: VIVIAN, YOUNGER & BOND, LIMITED, 8 BASINGHALL STREET, LONDON, E.C.2

Telephone: MONarch 7221/7

THE BRITISH TIN SMELTING COMPANY LIMITED

English Refined Tin

"HAWTHORNE" Brand

General Agents

W. E. MOULSDALE & CO., LTD.

2 CHANTREY HOUSE, ECCLESTON STREET, LONDON, S.W.1

THE STRAITS TRADING Co. Ltd. SINGAPORE

Straits Refined Tin

"Straits Trading Co. Ltd." BRAND

Correspondents in U.K.

W. E. MOULSDALE & CO., LTD.

CHANTREY HOUSE, ECCLESTON STREET, LONDON, S.W.1

E. M. JACOB & CO. LTD.

International Importers of all :

**NON-FERROUS ORES, MINERALS,
RESIDUES, MATTES, SLAGS,
BY-PRODUCTS, SCRAP METALS**

★

79 Bishopsgate, London, E.C.2

Phone: LONDON WALL 9341/3 Grams: "JACOMETA, LONDON"

GEORGE T. HOLLOWAY Co. LTD.

Metallurgists & Assayers

ORE TESTING, WORKS AND METALLURGICAL
RESEARCH LABORATORIES

**Atlas Road, Victoria Road, Acton,
LONDON, N.W.10**

Telephone:
ELGAR 5202

Grams and Cables:
NEOLITHIC LONDON

ROURA & FORGAS, LTD.

Telephone Nos:
HOLBORN 0517-9

Sole Sterling Area Suppliers of

ITALIAN QUICKSILVER

HANOVER HOUSE,

73-78, HIGH HOLBORN, LONDON, W.C.1

International Smelters and Buyers of

**SCRAP METALS
AND
RESIDUES**

• SLAG
• SKIMMINGS
• DROSSES
• SWEEPINGS
• ASHES
• BY-PRODUCTS

INTERNATIONAL SMELTERS LTD

Christchurch Road, London, S.W.19

Phone: Mitcham 2181

Wire: Intasmelta, Phone, London.

DEERING PRODUCTS LTD.

8 GREAT SMITH STREET, LONDON, S.W.1

**ORES - MINERALS - REFRACTORY
RAW MATERIALS**

Telephone: ABBEY 2481/2

Cables: PRODEERING, LONDON

PLATT METALS LTD.

METAL MANUFACTURERS and MERCHANTS

Buyers of

BRASS ROD SWarf AND SCRAP, and all descriptions of
NON-FERROUS SCRAP METALS, BORINGS AND
RESIDUES

Sellers of

BILLETS AND INGOTS TO ANY REQUIRED COM-
POSITION, GRADED NON-FERROUS SCRAP METALS

**METALEX WORKS, Great Cambridge Road,
ENFIELD, Mddx.**

Telephone: ENField 3425 (5 lines)

Telegrams: Walton, Enfield

LEAD

**H. J. ENTHOVEN
& SONS, LTD.**

Smelters and Refiners

- **ANTIMONIAL LEAD**
for the Battery Trade
- **LEAD ALLOYS**
for the Cable Trade
- **PRINTING METALS ● SOLDERS**

City Office: 89 Upper Thames St., London, E.C.4.

Telephone: Mansion House 4533. Telegrams: Enthoven, Phone, London
Works: Retherhithe, Croydon & Derbyshire

ELTON, LEVY & CO. LTD. METALS

ORES — TAILINGS — DUMPS — RESIDUES — SCRAP

1/4 ST. ERMIN'S (WEST SIDE), CAXTON STREET,
LONDON, S.W.1

Telephone: WHitehall 9621/2/3 Telegrams: Eppenleco, Sowest, London

CONSULTING METALLURGISTS

A.I.D. & A.R.B. Approved for
MECHANICAL TESTING
METALLURGICAL ANALYSIS

ACLOQUE & Co.

26 Bloomsbury Way, London, W.C.1 HOLborn 4487

WOLFRAM ORE TIN ORE

FELIX KRAMARSKY CORPORATION

39 BROADWAY
NEW YORK 6, N. Y.

Telephone:
Whitehall 3-0100

Cable Address:
Orewolfram

ZINC SHAVINGS GRANULATED & POWDERED NON-FERROUS METALS

"Lead Wool" for Pipe-jointing.

Metallic Packing for Pumps, etc.

THE LEAD WOOL CO., LTD.
SNODLAND KENT

Telephone: Snodland 04216 & 7 Telegrams: "Strength, Phone, Snodland"

ENTORES, LIMITED

KINGS HOUSE, 36 & 37 KING STREET,
LONDON, E.C.2

**NON-FERROUS METALS
ORES · RESIDUES**

Telegrams:
Entore Phone, London

Telephone:
MONarch 3415

MAYBANK METALS LTD.

This Company backed with the vast experience
gained in a 100 YEARS of progressive trading, will
expedite all orders...

**THE BUYING OF MIXED OR SORTED NON-FERROUS
SCRAP METALS and Supplying of Finely Graded Non-
Ferrous Scrap to Your Requirements.**

MAYBANK METALS LTD.

STAR WORKS, SPURGEON STREET, SOUTHWARK
LONDON, S.E.1 Telephone: HOP 2432/3
HOP 4212/3/4

ROKKER & STANTON LTD.

DRAYTON HOUSE, GORDON STREET
LONDON, W.C.1

Metal Stockists & Shippers

for

**BRASS, COPPER, ALUMINIUM
AND NICKEL SILVER**

in

Sheets, Rods, Tubes, Strip, Wire, etc.

Associated Companies in Holland and Belgium;
also Regd. in South Africa and Rhodesia.

Tel: EUS 4751/2 Cable: BENTLY 2nd; A.B.C.6
Grams: ROKKER, WESTCENT, LONDON

MINING & CHEMICAL PRODUCTS, LTD.

MANFIELD HOUSE, 376, STRAND, W.C.2

Telephone: Temple Bar 6511/3 Works: ALPERTON,
Telegrams: "MINCHEPRO, LONDON" WEMBLEY, MIDDLESEX

Buyers of Silver Ores and Concentrates

Smelters and Refiners of

BISMUTH

ORES, RESIDUES & METAL

Manufacturers of:

**FUSIBLE ALLOYS, SOLDER, WHITE METALS,
ANODES OF TIN, CADMIUM and ZINC IN
ALL SHAPES**

Importers and Distributors of:

**ARSENIC · BISMUTH · CADMIUM
CAESIUM SALTS · INDIUM · SELENIUM
TELLURIUM · THALLIUM**

THE ANGLO CHEMICAL & ORE CO., LTD.

PALMERSTON HOUSE • BISHOPSGATE • LONDON, E.C.2

Importers and Exporters
of

**MINERALS, ORES, RESIDUES
CHEMICALS, NON-FERROUS-
METALS AND SCRAP**

Telephone: LONDON Wall 7255 (5 lines)

Telegrams: CHEMORE, London

Established 1912.

Cables: "Hostombe"

Buyers of

WOLFRAMITE & SCHEELITE

R. HOSTOMBE LTD.

2, REGENT STREET • SHEFFIELD • ENGLAND

H. BARNETT LTD.

VICTOR ROAD, LONDON, N.7.

IMPORT : EXPORT

Phone: ARCHWAY 5461 (5 lines)

Established 1865

**WE SPECIALISE IN ALL NON-FERROUS
SCRAP AND INGOT METALS**

HENEAGE METALS

for Quality Ingots

IN BRASS, GUN METAL
& PHOSPHOR BRONZE.

PHONE ASTON CROSS 1177/8

HENEAGE METALS LTD. HENEAGE ST. BIRMINGHAM

Telephone : AMHERST 2211 (six lines)

E. AUSTIN & SONS

(London) LIMITED

ATLAS WHARF

Hackney Wick, London, E.9

Are Buyers of all scrap

**NON - FERROUS METALS,
GUNMETAL, ALUMINIUM,
COPPER, BRASS, LEAD, Etc.**

Manufacturers of

**INGOT BRASS, GUNMETAL
& COPPER ALLOYS, INGOT
LEAD, TYPE METAL, ZINC,
Etc.**

**The Mining Journal
1951**

ANNUAL REVIEW NUMBER

Summarises events and statistics of 1950

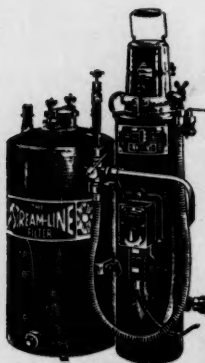
Is Now on Sale

- Orders for copies should be placed direct, or through Newsagents. 5s. post free.

Write: The Publisher, Mining Journal,
15 George Street, London, E.C.4.

"I SAVE POUNDS A YEAR . . ."

says the Transport Manager

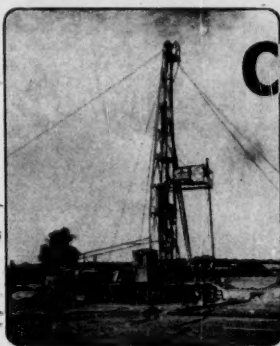
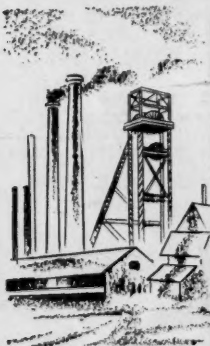


"With Stream-Line Filters, lubricating oil for my vehicles can be used over and over again. The result: lower charges for maintenance; longer periods between overhauls." 30,000 other users have also proved it!



STREAM-LINE FILTERS LTD

INGATE PLACE
LONDON, S.W.8
TELEPHONE
MACAULAY 1011



CORE DRILLING FOR COAL PROSPECTING

Illustrated is one of our Portable Mineral Drilling Units part of the modern equipment we have available for your every need, together with highly skilled personnel and 100 years experience.

WATER SUPPLIES
JOHN THOM Ltd
CANAL WORKS PATRICROFT MANCHESTER

Telephone: ECCLES 2261/2/3

Telegrams: THOM, PATRICROFT

HUWOOD

Head Office & Factories:

HUGH WOOD & CO. LTD., GATESHEAD - ON - TYNE II.

Industrial & Export Office:

DASHWOOD HOUSE, 69, OLD BROAD STREET, LONDON, E.C.2.

TELEPHONE: LONDON WALL 6631-2/3

TELEGRAMS: HUWOOD, AVE, LONDON.

Conveyors
for
every
output.